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CANADA AGRICULTURE

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JOURNAL OF THE CANADA DEPARTMENT OF AGRICULTURE
JOURNAL DU MINISTÈRE DE L'AGRICULTURE DU CANADA

"Canada Agriculture" is published quarterly by the Canada Department of Agriculture. Its purpose is to help keep extension workers and agri-businessmen informed of developments in research and other federal agricultural responsibilities as carried on by the various units of the Department.

Contributors, namely, professional personnel in the Department's Research, Economics, Health of Animals, and Production-Marketing Branches, Special Act Administrations (PFRA, etc.), and the Farm Credit Corporation are invited to submit their articles in either English or French.

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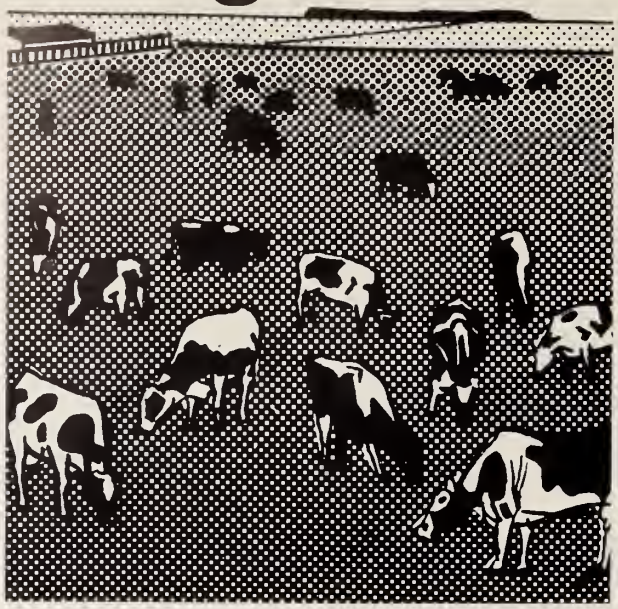
government assistance



C. R. PHILLIPS

I thought that this might be an interesting topic because it is apparent that little is known or remembered about the programs in effect.

I am not going to discuss better known aspects of the work of the Canada Department of Agriculture. By that I mean the program of the Research Branch; the grading and inspection services of the Production and Marketing Branch on seeds, feeds, fertilizers, pesticides, livestock, poultry, fruits and vegetables; the work of the Health of Animals Branch on contagious diseases and meat inspection; and similar work of the Plant Protection staff on plant diseases and insects. These are all most significant contributions to agriculture. The foregoing services, together with those of the Board of Grain Commissioners and the Prairie Farm Rehabilitation Administration, resulted in an outlay of $74 million in 1964–65.

However, I want to discuss other programs of assistance to agriculture, ones which resulted in expenditures by the Federal Government totalling about $1 billion in the last five years and $220 million last year.

TEMPORARY WHEAT RESERVES ACT

This is a program which increases the returns of western wheat farmers by about $40 million per year.

The authority is the Temporary Wheat Reserves Act which was instituted in 1956. Under it the Federal Government pays into the wheat pool annually the carrying charges for a year on each bushel in storage on August 1 in excess of 178 million bushels. The sum paid is approximately $40 million annually. As a result wheat returns average 6 to 16 cents a bushel higher. The level per bushel depends on the marketings of wheat in that crop year. For example, in 1961–62, when just over 300 million bushels were marketed, the per bushel return was increased by 15.7 cents while in 1963–64, when 568 million bushels were marketed, the per bushel return was increased by 7.9 cents.

PRAIRIE FARM ASSISTANCE ACT

Another assistance program applying in Western Canada is provided under the Prairie Farm Assistance Act. This program was established during the 1930's with the purpose of giving some measure of stability to farm income in years of low yields resulting from drought and, later, from other causes. Payments are made to farmers on an acreage basis according to the severity of the crop failure. Payments are limited to half the cultivated acreage of each farm up to a maximum of 400 farm acres. A one per cent levy is charged against all grain deliveries in the Prairie Provinces (except grain delivered by those with crop insurance). This levy has financed about one half the costs of the program. Since its inception in 1939 and up to 1965, $353 million has been paid out and the levy has returned $163 million.

FREIGHT ASSISTANCE PROGRAM

A program affecting East and West is the freight assistance program. It was initiated in 1941 with the twofold purpose of increasing the market for western grain and of providing a measure of assistance to livestock farmers in British Columbia and Eastern Canada who purchased western feed grain. To say the least, it has been a controversial subject, particularly in recent years, although it has the support of the two national farm organizations. Expenditures run from $17 to $23 million annually.

AGRICULTURAL STABILIZATION ACT

The Agricultural Stabilization Act was passed in 1958 as the successor to the Agricultural Prices Support Act. It is the basic means of providing price stabilization for agricultural commodities in Canada. The chief objective of this legislation is to stabilize the prices of agricultural products sold by farmers, thus reducing excessive fluctuations in their incomes.

The Act provides for the mandatory support of the prices of nine key commodities at not less than 80 per cent of their average market price for the preceding ten years. These nine products are: cattle, hogs, sheep, butter, cheese, eggs; and wheat, oats and barley not produced in the designated areas as defined in the Canadian Wheat Board Act. In addition to the

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Mr. Phillips is Director General, CDA Production and Marketing Branch, Ottawa, Ont. This article is based on a paper he gave to the Annual Meeting of the Canadian Seed Growers Association, July, 1966.

nine named commodities any other agricultural product may be supported under the Act. For the period 1959–1966 a number of items, including the following, have been supported: soybeans, sunflower seed, whole milk for manufacturing, skim milk powder dried casein, turkeys, honey, tomatoes for canning, tobacco, sour cherries, potatoes, and sugar beets.

There are three methods of implementing price support policies under the Act; namely, the purchase of the commodity at a prescribed price, the use of a deficiency payment or any other method of payment including a fixed subsidy. As experience has been gained with this legislation, the use of deficiency payments as a means of stabilizing prices has become more widespread. Furthermore, in Canada price support is limited to top grade products only and, in the case of eggs and hogs, to a limited amount of produce per farm.

The Agricultural Stabilization Board has at its disposal as working capital a revolving fund of $250 million maintained at that level by annual appropriations if there is any loss on the years' operation or by payment of any surplus to the consolidated revenue fund.

The total cost of the Agricultural Stabilization Board programs in the first eight years of operation, which ended March 31, 1966, was $439 million.

The current dairy program comes under the Agricultural Stabilization Act. The program authorizes the Agricultural Stabilization Board to pay 85 cents per hundred weight of manufacturing milk. There will be a holdback of 10 cents per hundredweight for use in the export of certain milk products.

This program will cost about $90 million and represents to milk and cream producers improved returns over last year of about 14 per cent.

PRAIRIE FARM REHABILITATION ACT

This program was initiated in the middle 1930's to alleviate: (1) the severe soil erosion problem that resulted from a prolonged period of drought in the Prairie Provinces and (2) the hopeless income situation into which many farmers had fallen when their farms became unproductive.

Early PFRA measures in respect of erosion control were in the regrassing of certain susceptible soil areas, the establishment of field shelterbelts, and assistance in providing many thousands of farmers with dugouts and small dams to conserve local water supplies for the benefit of farm livestock, and small garden and field developments, as well as domestic water supplies. At the same time certain rehabilitation efforts were extended to assist in the removal of farmers from areas which had proved to be unsuitable for arable farms and their establishment in irrigated areas particularly where farming success was more assured.

This latter movement of farmers to irrigated areas led to an extension of the water development activities of PFRA into the management and establishment of larger irrigation districts. These irrigation developments were extended from farm schemes to community irrigation projects, which mainly provide assured water and feed supplies for the livestock enterprises in the area, and eventually to the acquisition of a complete irrigation district as a going concern. Further, in co-operation with the provinces whose jurisdiction was also concerned, PFRA has built the main works of the St. Mary and Milk River Irrigation Project in Alberta, and is now completing similar main works on the South Saskatchewan River Project in Saskatchewan. PFRA has also been concerned with other small- and large-scale water control projects in the agricultural sector such as the drainage area at Pasquia in northwest Manitoba. To a large extent future agricultural development in the Prairie Provinces will depend upon the agricultural utilization of water for irrigation in the drier portions of the three provinces. To this end PFRA is making a comprehensive study of the water resources available to the area together with engineering studies of feasible means of making these water supplies available where they are required. PFRA, therefore, continues to be one of the main agencies of the Department in the field of agricultural development in the Prairie Provinces.

In 1964-65 federal expenditures on PFRA projects totalled about $18 million.

MARITIME MARSHLAND REHABILITATION ACT

The MMRA program was instituted by federal legislation in 1948 to provide assistance in the provinces of Nova Scotia, New Brunswick and Prince Edward Island in preserving and developing tidal marshland areas most of which are situated adjacent to the Bay of Fundy. The areas are subject to flooding by tidewater unless protected by systems of dams or dykes and aboiteaux (fresh-water control structures). The soils are potentially productive and when properly used yield excellent crops.

Responsibility for the rehabilitation of approved marshland areas is shared by the provincial and federal governments. The latter undertakes the construction of works required to prevent flooding of lands by salt water, maintains the structures until the responsibility is turned over to the provinces, and provides engineering services required in connection with the program. The provincial governments organize the owners of

land, ensure that the marshland areas are adequately drained, and that suitable land-use policies are developed and encouraged.

AGRICULTURAL REHABILITATION AND DEVELOPMENT ACT

This Act was initiated by the Department of Agriculture and was passed in 1961. The background of this legislation was in part a long experience with PFRA and in part the persistence of local areas of low farm income and the attendent social ills throughout the country. While PFRA is primarily a program directed towards the conservation and development of soil and water resources in Western Canada, the ARDA program is directed towards the human problems associated with low incomes and lack of work opportunities in rural areas. The program's concern with resources, as such, is only incidental to its concern with rural poverty.

The early phase of ARDA was characterized by a major program of research directed towards discovering the underlying causes of low income and poverty and in defining the areas where such conditions exist. At the same time a substantial program of land development and drainage has been assisted in various provinces where these projects are known to contribute to the income of a number of farmers.

Fundamentally, the ARDA program depends upon provincial initiative and has regard to the responsibilities of the provinces in resources administration, extension and adult education. Many of the rural areas in the country have made a satisfactory adjustment to the changing technology of farming which displaces workers in this industry to an increasing degree of industrialization in the larger urban areas. However, some areas have not made this adjustment and the ARDA program supports certain development projects which will improve the incomes of the residents. It also envisages educational and training programs which will assist in the transfer of people to other occupations.

Expenditures under this Act have been increasing as the ARDA committees in the various areas have begun to function. During the last fiscal year federal expenditures were about $12 million. I should say too that the program is now administered by the Department of Forestry.

QUALITY PREMIUMS

For some years now the Federal Government has been paying quality premiums on hogs, lambs and cheese.

The premium on hogs is $3 for Grade A hogs marketed through inspected plants; the premium on 94 score cheese is two cents and on 93 score it is one cent per lb; the premium on Canada Choice Class 1 lamb is $2 and on Canada Good Class 1 lamb it is $1.

Expenditures in 1964-65 were just over $10 million.

AGRICULTURAL LIME ASSISTANCE

Since World War II there has been a joint federal-provincial program providing assistance to farmers in the purchase of lime. There are seven provinces where soils require liming and each has a program. Under the program the Federal Government pays 60 per cent of the cost. Federal expenditures are about $1.6 million per year.

These are the main continuing programs and include those where sizeable expenditures are made.

Up to this point, I have been discussing assistance programs involving significant expenditures of money. However, there are programs and legislation of very great significance to agriculture where the cost is not great.

These programs are designed to give farmers an opportunity to obtain credit, protect their crops and market their produce. In certain cases it is federal legislation designed to complement provincial legislation where federal jurisdiction is involved. In other cases it is legislation to provide funds to provincial programs where provincial jurisdiction is involved.

In this field let us first look at farm credit.

FARM CREDIT

The senior government first passed such an act in 1927. However, this act was not to become operative in all provinces until 1935 because of a lack of provincial enabling legislation.

With the beginning of World War II there developed a tremendous movement of rural people to urban centers. Looking to the future the Federal Government became concerned with the problem of urban unemployment after the war and the rehabilitation of returning war veterans. As a consequence of these considerations, the Veterans Land Act was consequently passed in 1942. By the Act's provisions war veterans who wished to return to farming on being

discharged could obtain financial assistance as well as assistance through the supervision of fieldmen. The supervision aspect of the Act was found to be so successful that it was later incorporated into the Farm Credit Act of 1959.

Also with the beginning of World War II a heavy demand was made on Canadian farmers for increased production with very little increase in price incentives. The movement of rural youth to armed forces and into industry made it essential that farmers mechanize their operations as fully as possible. In spite of these difficulties, new technological developments and new types of machinery and equipment made it possible for farmers to rapidly increase production. In order to sustain and expand this production, it was considered that intermediate term credit was necessary for the purchase of new machinery, livestock and other essentials. This need was met by the enactment by the Federal Government of the Farm Improvement Loans Act in 1944. These loans were provided by private banks but were guaranteed by the Federal Government.

Over the years the maximum size of mortgage loans increased by stages from $6,000 to $55,000 in 1964 under the amended Farm Credit Act.

A further development in farm credit involving a new concept was the passage of the Farm Machinery Syndicates Credit Act. This Act provides loans to groups of three or more farmers for the purchase of farm machinery. It is considered that by joint ownership and operation of some machines farmers will be able to effect a reduction in capital requirements and a reduction in the operating costs of these machines. (*Canada Agriculture*, Spring '66 issue, carried a feature article on the FMSC Act.)

MARKETING BOARDS

Another area of interest is the activity of marketing boards created under federal or provincial legislation.

Producers' marketing boards are organized in all provinces, except Newfoundland, under provincial legislation. They are most important in the agricultural marketing picture in Ontario, British Columbia and Quebec. The first two of these provinces have had legislation and board activity since the 1930's and Quebec's considerable activity commenced in 1957. Enabling acts in other provinces were mostly passed between these two dates.

A Federal Statute, the Agricultural Products Marketing Act, was passed in 1949. Under this Act the powers exercised by a board to control the marketing of a product within a province may be extended to interprovincial and export trade. Some 36 of about 80 producer marketing boards in the country have their powers so extended.

The Federal Act was amended in 1957 to permit extension of authority to make levies for ". . . the creation of reserves, and the payment of expenses and losses resulting from the sale or disposal of any such agriculture products, and the equalization or adjustment among producers of any agricultural product of moneys realized from the sale thereof . . . ." This part of the Act is necessary because indirect taxation is the exclusive prerogative of the Federal Parliament.

Eight boards, all in Ontario, have their powers extended to collect levies.

AGRICULTURAL PRODUCTS CO-OPERATIVE MARKETING ACT

Under this Act the Federal Government may enter into an agreement with a co-operative or other group for the marketing of a farm product whereby the Government authorizes the co-operative to make an initial payment to producers for the product on a grade basis at the time of delivery. The Government guarantees necessary handling and selling expenses plus the initial payment which is subject to negotiation and may not exceed 80 per cent of the average return over the previous three years. This procedure aims at providing a higher average return to producers by avoiding flooding of the market during certain periods.

Various products have been marketed under the Act since 1939 including honey, potatoes, onions, oats, barley, flax, rye, corn, mink and fox pelts, apples, apricots, tobacco and, in every year since 1939, forage crop seeds from Saskatchewan.

Very few losses have been incurred by the Government. The Act was not intended and is not used as a price support measure.

In conclusion I want to repeat that there are many valuable programs[1] available to agriculture through federal legislation. There are those which make significant payments directly or indirectly to farmers, there are those which provide the legislative facilities for farmers to help themselves, there are those which provide credit, crop insurance and market stability. Each year finds new programs or adjustments in old programs to meet changing conditions.

Into what areas do the payments go? Some people claim that the West gets more than the East. I am sure that on occasion this is so because drought has been a continuing problem in Western Canada. I can, however, say that in the past three years expenditures on agriculture in the East and in the West have been almost exactly the same.

Overall agriculture expenditures by the Federal Government were approximately $300 million last year while provincial expenditures approached $100 million.

[1]The Federal Crop Insurance program is discussed elsewhere in this issue.

COMMON ROOT ROT

AN APPROACH TO ITS CONTROL

B. J. SALLANS AND R. D. TINLINE

In the Prairie Provinces, common root rot is a prevalent disease of cereals, particularly wheat and barley, and is caused primarily by one fungus, *Cochliobolus sativus*. Estimates of annual loss indicate that it is a major disease causing losses in wheat ranging from 5 to 15 per cent of the total harvest. Being an unspectacular disease, seldom resulting in the death of plants after the seedling stage, and occurring chiefly below ground level, it frequently goes unnoticed. Practical control measures have not yet been devised although they are being sought. One approach to control is the development of resistant varieties.

As a first step in this approach at the CDA Research Station in Saskatoon, we tested large numbers of wheats including named varieties, and lines from the USDA World Collection of Small Grains, as seedlings in the laboratory for resistant types. All the wheats exhibited some disease, but from these and other tests, three named varieties, Thatcher, Willet and McMurachy, and two lines, 182 and 492, were selected as having better than average resistance levels.

Crosses were made between these five wheats. One plant was grown from each seed of the crosses. Subsequently, seeds from some of the ensuing single plants were grown in the greenhouse and this procedure was repeated in the third generation to establish single plant lines. Testing these lines for resistance under natural field conditions seemed desirable for two major reasons. Firstly, seedling or plant reactions under controlled conditions may not duplicate what occurs in the field. Secondly, large numbers of lines could not be readily grown for comparison indoors.

We anticipated that varietal reactions in the field would not be complicated by pathogenic (disease causing) races of the fungus. In earlier studies, we found that all our isolates from naturally infected wheat were pathogenic and tended to attack wheat varieties similarly.

Drs. Tinline and Sallans are plant pathologists at the CDA Research Station, Saskatoon, Sask.

In our investigations, we developed a field testing method based largely on research findings and observations by pathologists and a microbiologist at Saskatoon. The method and reasons for the techniques follow:

1. Tests are conducted on fallow land chiefly in the brown soil zones of Saskatchewan. We know that spores of the fungus occur in large numbers throughout cereal crop land. Spores, however, generally remain dormant in soil until they are stimulated to germinate by substances provided by host and non-host plants or other organic addenda. The viability of the dormant spores usually declines slowly. Consequently, adequate numbers of spores are present in fallow land to cause maximum disease in a susceptible host. Fallow land is preferable to stubble because of its easier workability. Severity of disease often is higher in brown than in the black soil zones.
2. Seed is planted at a depth of $2\frac{1}{2}$ to 3 inches. Deep seeding increases disease severity. Since spores of the fungus occur in the top few inches of soil and the subcrown internode of wheat is a susceptible tissue, the longer the internode the greater the chance for multiple infections.
3. Plants in the firm dough stage are rated for disease on the basis of the lesions on their subcrown internodes. The crowns of mature plants are rapidly invaded by various soil organisms and consequently an accurate assessment of common root rot must be made prior to this stage. We require seed of the plants and this can be obtained at the firm dough stage. Disease severity in the subcrown internode was found to represent the total disease in the plant and for simplicity it is the part rated.
4. A disease rating calculated for each replicate in a test affords an index for the selection and comparison of lines. The rating is the number of plants with moderate or severe disease expressed

as a percentage of the total number of plants. It was determined that the omission of slightly diseased plants introduces little error in the rating.

5. The progeny method of selection is always maintained. Through chance, some single plants will escape disease. By determining the disease rating from numerous plants and assigning this value to the single plant from which these originated, the problem of disease escapes, is minimized, and the selection of resistant lines is made more reliable.

In field tests the majority of the F3 lines were similar to the parents in their disease reactions. A few, however, were more resistant and some were more susceptible than the parents. These were retested in two or more susbequent generations. A small number of the resistant selections appeared susceptible in later tests, likely because of continued segregation, and they were discarded. The majority of resistant lines maintained their resistance over the years in many tests and at several locations. Although the lines are not immune, they are much more resistant than the commercial varieties.

Presumably, resistance to common root rot in wheat is polygenic (controlled by several genes). The progeny from our crosses showed a continuous range of variation from susceptible on the one hand to resistant on the other, rather than falling into a few distinct classes. This mode of inheritance was not unexpected for several reasons. Firstly, the severity of disease in a variety or line varies considerably from one location to another, and at one location from year to year, indicating the lack of clear-cut susceptible and resistant reactions. Secondly, pathogenic races of the fungus are not sharply defined which also indicates the absence of discrete varietal or line reactions. Finally, virulence in the fungus, *C. sativus*, appears to be polygenic (controlled by several genes). Progeny of crosses between isolates highly and weakly pathogenic to wheat seedlings did not segregate equally into the two classes. The majority of progeny were highly pathogenic. Approximately 25 per cent of the progeny from other crosses between isolates of similar pathogenicity were significantly more and less pathogenic than the parents, the remainder showed a continuous range of variation between these extremes. Single spore isolates from the parents did not exhibit this wide range of variation. Since virulence in the pathogen is assumed to be reciprocal to resistance in the host and the former is polygenic, it follows that resistance also is polygenic (controlled by several genes).

The results of our work at Saskatoon afford some degree of optimism that the control of common root rot can be achieved by breeding resistant varieties. The development of these varieties, however, appears quite a formidable task. Continued research on the disease and search for new and better sources of resistance, and for more rapid methods of assessing wheats may expedite the breeding program.

TABLE 1—AVERAGE DISEASE RATINGS AND ESTIMATED REDUCTIONS IN YIELD OF SOME RESISTANT AND SUSCEPTIBLE LINES OF WHEAT

Selection	Variety or line	Disease rating[1] (percent)	Loss in yield[2] (percent)
Resistant.....	680	3	1.7
"	635	5	2.3
"	1639	5	1.8
"	2319	10	3.3
	Thatcher	19	4.9
	Cypress	—	11.4
Susceptible....	1510	24	8.8
"	210	43	13.4
"	1978	47	17.3
"	1464	58	25.7

[1] Average of 19 tests conducted in 1964.
[2] Estimated as a percentage of the expected yield in 6 tests conducted in 1965.

1. Spores (conidia) of the fungus, *Cochliobolus sativus*.
2. Typical disease severity in resistant selection 108 (above) and (below) susceptible selection 1464 in a field test.

S. R. LOSCHIAVO

Experiments at Winnipeg reveal that food lures have controlling effect on the confused flour beetle, and the rusty grain beetle.

For several years, chemical warfare on an unprecedented scale has been waged on many world fronts against insects that destroy man's food supplies, or affect his health. The use of modern insecticides has contributed significantly towards increasing agricultural production, and in reducing the world's death toll from insect-borne diseases. Unfortunately, the intensive use of pesticides has disadvantages as well as advantages. Many pesticides that once gave satisfactory control no longer do so because some kinds of insects have become resistant. Many are non-selective and affect beneficial insects such as pollinators, certain parasites, and predators. Some retain their insecticidal activity for long periods of time resulting in the build-up of undesirable residues in soil, plants, and animals. Some insecticides have been found in remote areas far from sites of application.

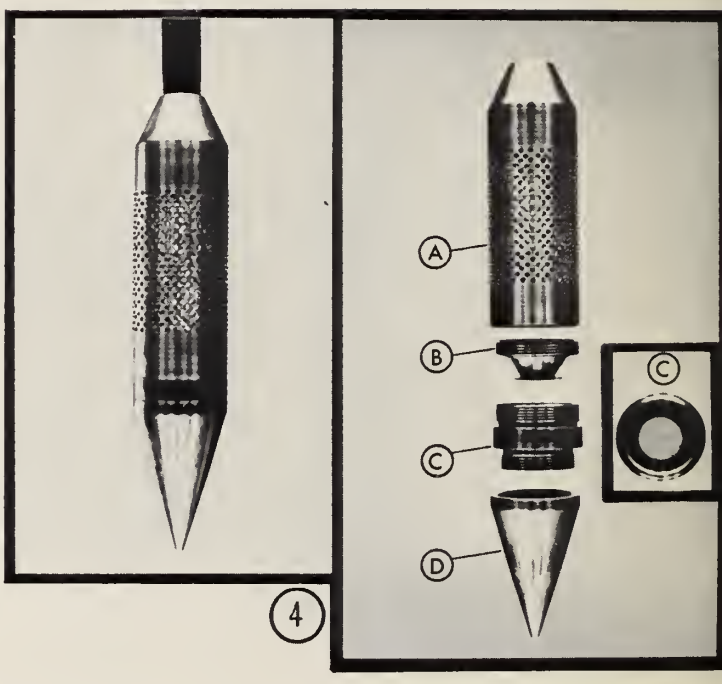
We are thus faced with a dilemma. On the one hand we must use insecticides to maintain a high rate of productivity and good health and on the other we must cope with the problems associated with their use. Biological or cultural control methods cannot, by themselves, provide adequate protection from all insect pests. No short-term or single approach to insect control will solve our insect problems. Only an integrated, multiple-approach program utilizing the best features of chemical and natural control would appear to offer the most promise in serving the interests of food growers, processors, and consumers both in the quantity and quality of the food produced.

The use of chemical attractants to lure insects is one of the newer methods being explored as a control measure in the multiple-approach program. The best-known examples are the so-called sex attractants. The eradication of the Mediterranean fruit fly in Florida was aided by the use of traps baited with a powerful attractant and a volatile insecticide. The attractant in this case was specific for males. Similar techniques are now being used to detect invasions of many other insects in the United States. Sex attractants have been noted in some moth pests of stored products.

A promising area of research that may lead to selective control lies in food lures. Substances derived from an insect's natural food or from micro-organisms used as food may affect feeding behavior by attracting

Dr. Loschiavo is a specialist in the biology and physiology of stored product insects, CDA Research Station, Winnipeg, Man.

food



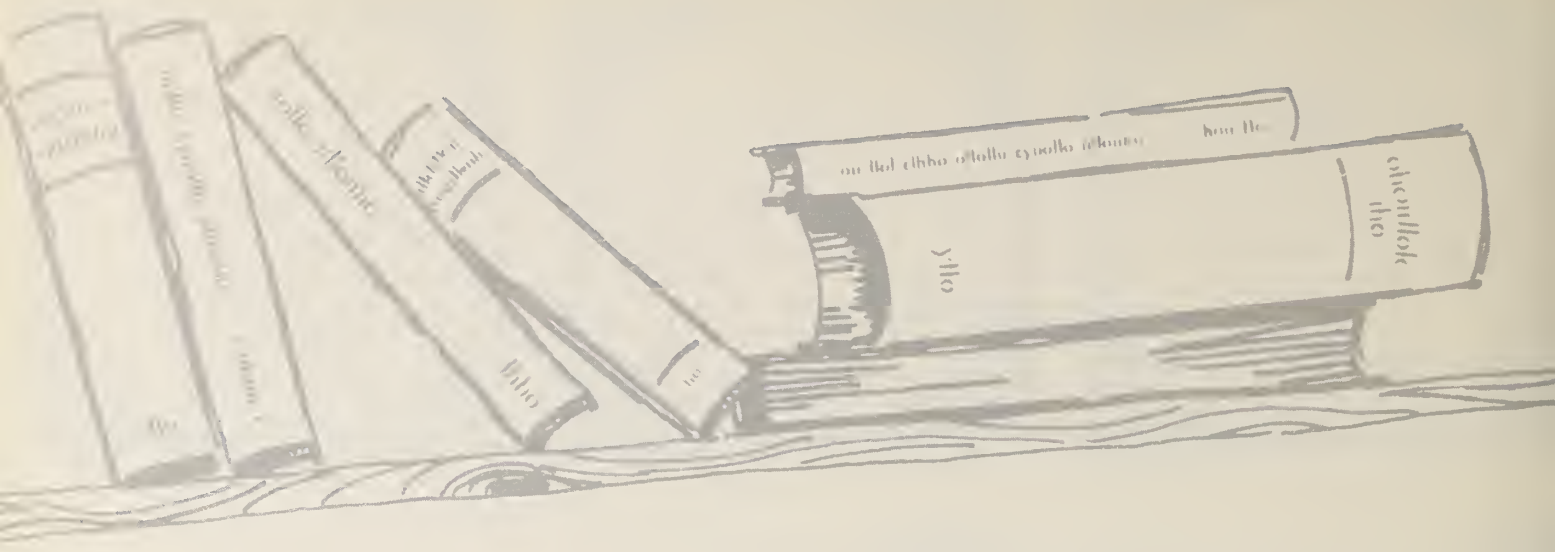
1. Aggregation of flour beetles on a pith disc impregnated with a stimulative extract.
2. Aggregation of rusty grain beetles on a wheat kernel infected with a stimulative fungus.
3. Apparent repellency of an ether-soluble component in brewers' yeast. Only one beetle is in the vicinity of the treated disc.
4. Trap cage for grain insects. Left: assembled, and in normal position. Right: exploded view, showing component parts. (A) wall of hollow cylinder drilled to allow entry of insects; (B) tapered cone portion with center hole through which insects fall; (C) screened platform on which insects land (see insert), and from which they cannot crawl back up into B; (D) solid brass cone to permit easy insertion into grain. Stimulative components are placed in a shallow depression at top of cone.

lures FOR STORED PRODUCT INSECTS

insects, by causing them to stop and feed, or by repelling them. Research in this area is currently underway at the CDA Research Station, Winnipeg. In our experiments with the confused flour beetle, *Tribolium confusum* duVal, an economically important pest in flour mills and warehouses, we found that certain components extracted from wheat germ, bran, and brewers yeast cause it to stop, or feed, or both. We also discovered that the rusty grain beetle, *Cryptolestes ferrugineus* (Stephens), a major pest of stored grain in Western Canada, responded to stimuli from components of wheat germ and of some fungi associated with stored grain. In our laboratory studies, we observed that the active substances incorporated in an inert material caused insects to stop upon contact and frequently to feed. The effect of this behavior was the formation of aggregations of insects at the site of the stimulative substance. Sometimes these formed very quickly, suggesting that an attractant was also present. We measured aggregations of flour beetles in a circular arena containing two pith discs, one untreated and the other treated with an active extract. The amount of feeding was measured in a photometer. The difference in the amount of light passing through the disc before and after exposure to insects was used as a measure of feeding activity. Pith discs were unsuitable for use with rusty grain beetles. These insects were given a choice between untreated wheat kernels, and kernels infected with a fungus. We estimated the amount of feeding on the basis of the amount of kernel consumed in a given time interval.

The precise identity of individual compounds that cause these insects to stop or feed is not known. Certain amino compounds and sugars in brewers' yeast stimulate flour beetles. Yeast also contains an ether-soluble fraction that apparently repels beetles. The insects moved as far away as possible from a pith disc treated with this fraction. In our tests with some pure compounds known to occur in wheat germ and in other wheat fractions, certain fatty acids and sugars stimulated strong feeding responses in flour beetles. We found that rusty grain beetles aggregated in large numbers and fed on damp wheat kernels infected with certain kinds of fungi. The strongest responses were evoked by infected kernels with exposed germs. Two of the most active fungi were *Nigrospora sphaerica* and *Hormodendrum cladosporiodes*. Both of these are likely to occur when grain is left in swath for several weeks during a long spell of cool, wet weather. Grain combined from the damp swath and stored in this condition is susceptible to insects and mites, provided the temperature is high enough. It is possible that feeding stimulants in the fungi, or in the exposed germs of broken kernels may induce a high rate of feeding by insects and consequently lead to a heavy infestation.

In our investigations, we constructed special trap-cages for field use. These have been designed so that grain beetles can enter, but not escape. A compartment inside the trap can be baited with known stimulants combined with a toxicant and inserted into a bulk of infested grain. If successful, such traps may be useful as a means of controlling stored-products insects. A further application of this method is in the detection of hidden insect and mite infestations in stored grain or in mills and warehouses.



HELEN MARQUIS

Farmers today have more things to do, in less time, than ever before. But, to do many of the things successfully, requires a specialized knowledge. A bookshelf is one way of acquiring this knowledge.

To acquire knowledge of the latest developments in this age of scientific farming; to develop the techniques required to stay in the business; and to give one's self a fighting chance to secure an adequate return for labor and management seem logical reasons for maintaining a bookshelf.

The contents of the bookshelf will depend to some extent upon the type of farm enterprise. There will be a few books for handy reference in regard to those things that do not basically change over time. There should be an abundance of pamphlets, periodicals and records that are of a current nature and in tune with the ever-changing scene in agriculture. The following categories should be considered:

1. Basic References:

Tables of weights and measures commonly used and how to calculate these. Some elementary guides in plumbing, electrical wiring, welding, carpentry, mechanics and veterinary medicine.

2. Technical Data:

Information regarding particular varieties of crops to grow; kinds of fertilizers and rates of application suitable for a particular soil; irrigation requirements; nutrient content of feeds and the quantities of feed to achieve certain rates of gain; types and rates of pesticides and how to use them.

3. Records:

In this category are the account books with details

The author is Librarian, Economics Branch, CDA, Ottawa.

BOOKSHELF FOR FARMERS

of expenses and income relating to the over-all farm business. There should be records with details of quantities of crops grown or milk produced, livestock born, calving dates, hours of labor and many others. Records could deal with each farm enterprise. These records combined would then give a total farm picture. This should include the household and off-farm information.

Records are needed for other than income tax purposes. An analysis of well-kept records should give the strengths and weaknesses of each enterprise. From such an analysis appropriate adjustments can be made.

4. Economic Information:

To assist the producer of agricultural products to make these business-like adjustments and to keep in touch with changing conditions the bookshelf should contain up-to-date bulletins, magazines, and newspapers that give the following information:

(a) Sources of credit and how to make the best use of credit.

(b) A manual of farm management principles in budgeting, least-cost combinations of feed; break-even price tables for feeder cattle; forms for estimating profit in crops or livestock production; how to draw up a lease arrangement; how to calculate true rates of interest, cost data for all supplies required in farming and needed for preparing budgets.

(c) Market outlook material is needed if one is to assess enterprises so as to know whether to develop, expand or drop a project. There is obviously no economic logic to producing a product for which there is no market, or one which consistently sells at a price below an individual's cash costs of production.

WHERE TO GET THE INFORMATION

The District Agriculturist (or Agricultural Representative) is considered the best single source of information on farming practice. If the Ag. Rep. does not have the information himself, he will know where to get it. He may refer a farmer to the federal or a provincial department of agriculture, experimental farm or station, university or agricultural school. Other sources of help are private firms dealing in a particular product, farm organizations, co-operatives, farm papers and magazines and public libraries or local schools.

In many provinces there are "Farm Business Associations" which have been established by the particular provincial farm economics branch and the Ag. Reps of that area. These associations are groups of farmers who meet regularly to learn how to keep records, to prepare budgets, to analyze their own farm business, and to learn a few basic economic principles. The information gained from these and other types of farm organizations are important to a farmer who wishes to remain in the business. Here, too, a farmer can learn the types of books, publications and records that he needs for his bookshelf.

A bookshelf is only as useful as the ease with which a farmer can find the information required at a particular time. To make this possible, a special location, preferably a small space that can serve as a permanent office is the ideal. A set time for using the bookshelf regularly is also desirable for best results.

FARMER'S WIFE'S BOOKSHELF

Many farmers share decision making with their wives. Possibly more so than any other business. This is why it is important for the farmer's wife to have

her own bookshelf to help her run the home, and to contribute to the farm enterprise as well as to the community.

If methods of farming have greatly changed, the technological revolution has brought changes in maintaining and managing the home as well. Not only is the farmer's wife released from many of the chores out-of-doors, but inventions in household appliances, in the methods of preserving and storing food, or in shopping for household needs have made it necessary for her to have a more business-like approach to home-management.

Changes in rural communities, in transportation and relationship between the rural and the urban way-of-life have created new problems, not only for the management of the farm and home, but in the relationship between the younger and older members of the family. An awareness of the children's social and educational needs is more important than ever.

Every woman who operates a home has a few basic books, but with home-management changing so rapidly it is now necessary to add an up-to-date scrap book of new data. This should provide knowledge of changes in home management. If freezing has replaced home-preserving, if more frequent shopping has replaced storing, if ready-made articles of clothing are more economical, then the housewife has to know what others have learned about these matters and adjust her own way of life accordingly. The farmer's wife's bookshelf should contain the following:

1. Records

The housewife has to know not only how to budget her income, but the source of it. It is said that it is not what you make, but what you save, that makes the income. This is why the housewife's records or account books of income and expenses relating to all household activities is important, not only to herself but even more so to the family. The farmer's wife more than any other needs to know whether it is more economical to sell the produce from the farm, or to process it for home use. She needs to know how her income was spent the previous year and where adjustments should be made.

2. Basic References

With the rural home-maker buying more and more from the supermarket it is now more important to know the price relation to content, size and quality of the prepackaged foods. Tables of measures are important to her. So is the type of material to buy. What one should expect to find on the labels of processed food and manufactured articles of clothing are essential basic knowledge that must be learned.

A farmer's wife lives farther from the market than the urban wife. She does not go shopping as often, and it is more expensive to have to get a forgotten article. She must learn how to substitute foodstuffs on hand for one she needs.

This distance from the market and the economical use of her income makes it imperative to know the "best time" to buy quantity items for processing.

3. Technical Data.

More time is needed for an ever broadening community life. Increasing numbers of associations, community interests increasing scope, and women taking a more active part outside of the home, make it necessary that women keep informed about technical changes in home making and the benefits that can be derived from the expenditure necessary for these changes.

Changes in methods of transporting children to consolidated schools, greater emphasis being placed on the nutrient content of food for the family welfare makes it necessary to know what is taking place in nutritional knowledge, and the need for balancing school lunches with the meals needed in the home.

Just as farmers have learned the necessity of short courses in farming, there is a growing awareness of short courses needed for the farmer's wife. This applies to nursing, nutrition and home-making. A basic book on first aid and home nursing is essential in the farmer's wife's bookshelf.

SOURCES OF MATERIAL

If just starting a bookshelf, your nearest public library or National Library in Ottawa should have initial suggestions of value.

For information on processed articles read the labels on the cans or packages. The government requires that all manufacturers supply pertinent data to the public.

Federal and provincial departments of agriculture, consumer sections and provincial food councils can help with information on nutrition.

The farmer's wife will discover that the best sources of information other than farm papers and extension information are found in the exchange of ideas in her local association and community meetings.

It is not what you have, but how much you use it, and how much you share it that counts. Intellectual investments are a vital factor in the development of a home, a community or a country. Knowledge is acquired only through application. One's bookshelf could and should help.

INFORMATION SOURCE

Readers with specific questions about starting or expanding a bookshelf should write to: Canada Department of Agriculture, Information Division, Ottawa.

K. F. WELLS

BRUCELLOSIS RING TESTING SAVES TIME AND MONEY

Once all the cattle in a district have been brucellosis tested and the infected animals removed, the regular application of rapid screening tests will quickly identify new centers of infection without having to blood-test all of the cattle every few years.

The Brucellosis Ring Testing program (BRT) is designed to do this work in dairy herds, in much the same way as the Market Cattle Testing does in range and beef-producing areas.

Under the BRT program, samples of milk and cream are collected from each patron's supply at all dairies and creameries. The samples are tested for brucellosis, and whenever there is a suspicion of infection, the owner's herd is submitted to a blood test to determine if brucellosis is present and to eradicate the disease if it does exist.

Provided brucellosis ring tests are conducted at regular intervals (at least three times a year on all milk-producing herds) the area can be recertified without resorting to further blood testing.

In addition to its value in the recertification of brucellosis areas, the brucellosis ring test is generally accepted as a herd test in certifying cattle for export to other countries. (*Continued on next page.*)

Dr. Wells is Veterinary Director General, CDA Health of Animals Branch, Ottawa, Ont.

L'ÉPREUVE DE L'ANNEAU REPRÉSENTE UNE ÉCONOMIE DE TEMPS ET D'ARGENT

Lorsque tous les bovins d'une zone ont subi l'épreuve du sang et que les animaux infectés sont abattus, il est facile de dépister les nouveaux foyers d'infection sans recourir à des prises de sang tous les deux ou trois ans.

L'épreuve de l'anneau permet de découvrir les nouveaux foyers de brucellose avant que l'infection ne soit trop répandue. On l'emploie pour dépister l'infection dans les troupeaux laitiers tandis qu'on utilise l'épreuve des bovins de marché pour les animaux de boucherie.

Pour l'épreuve de l'anneau on recueille des échantillons du lait ou de la crème fournis aux laiteries ou aux beurreries par chaque cultivateur. Ces échantillons sont éprouvés pour la brucellose; si on soupçonne l'infection, tout le troupeau du fournisseur est soumis à l'épreuve du sang Lorsque l'infection existe, il s'agit alors de l'extirper.

Pourvu qu'on exécute l'épreuve de l'anneau à intervalles réguliers, c'est-à-dire au moins trois fois par année pour tous les troupeaux laitiers, on peut recertifier une zone sans recourir à l'épreuve du sang.

En plus, l'épreuve de l'anneau est couramment acceptée comme épreuve standard. Pour fins d'exportation, on peut certifier qu'un troupeau est négatif s'il a subi une épreuve négative. (*Suite à la page suivante.*)

Le Dr Wells est Directeur vétérinaire général, Direction de l'hygiène vétérinaire, ministère de l'Agriculture du Canada, Ottawa.

MILK RING TESTING

ÉPREUVE DE L'ANNEAU

The operation of this program can be summed up in four basic steps:

1. Milk or cream samples are collected at dairies and creameries at regular intervals from all milk and cream shippers.
2. These samples are forwarded to a federal laboratory, where they are tested for brucellosis.
3. Test results are forwarded to federal disease control officials in the provinces where the samples originated.
4. Negative tests are credited to herds and areas of origin.

When the tests indicate that infection may be present, the Health of Animals Branch veterinarian works directly with the owner until the disease is eradicated.

WHO PARTICIPATES IN THE PROGRAM?

Every livestock owner who ships milk or cream.

The owner should make sure that the plant records show that he owns the cattle supplying milk to the dairy, so that he will be credited with a test under the program.

AREA CAN BE RECERTIFIED ON THE BASIS OF BRT RESULTS

Any area that has once been certified as a result of a blood test can be recertified for a period of three years under this plan, provided that milk or cream samples from all of the herds have been tested at least three times each year for a three-year period.

WHAT IS A BRUCELLOSIS RING TEST?

The ring test, conducted on milk or cream samples, is based on the fact that brucellosis-infected cows shed anti-bodies known as agglutinins in their milk. When milk samples containing brucella agglutinins are mixed with a stained brucella antigen, a reaction occurs which can be utilized to detect the presence of infection in a herd. The reaction shows as a blue ring in the sample.

ARE SAMPLES TAKEN AT ALL DAIRIES AND CREAMERIES?

Health of Animals Branch inspectors visit all dairies and creameries at regular intervals to arrange for the collection of samples from every patron. If a livestock owner ships to more than one plant, or changes his contract from time to time, samples will still be collected and the tests credited to him, provided that the inspector knows from whose herd the milk or cream originated.

WHERE ARE MILK SAMPLES TESTED?

Actual testing is done by qualified personnel at various laboratories operated by the Health of Animals Branch.

Le programme comprend quatre étapes essentielles:

1. À intervalles réguliers des échantillons de lait ou de crème sont prélevés aux laiteries et beurreries pour chaque expéditeur de lait ou de crème.
2. Ces échantillons sont expédiés à un laboratoire fédéral et soumis à l'épreuve pour la brucellose.
3. Les résultats des épreuves sont transmis au vétérinaire en chef (fédéral) de la province d'origine.
4. Le vétérinaire qui s'occupe du contrôle de la brucellose pour une zone déterminée attribue les résultats à qui de droit.

Lorsque l'épreuve indique la présence de l'infection, la Direction de l'hygiène vétérinaire collabore directement avec le propriétaire jusqu'à l'élimination complète de la maladie.

QUI PARTICIPE AU PROGRAMME?

Tous les cultivateurs qui expédient du lait ou de la crème.

Tout éleveur devrait s'assurer que son nom est inscrit de la même façon à la laiterie et chez le vétérinaire fédéral local. Il aura ainsi la certitude que tous les résultats d'épreuve de son lait sont crédités à son troupeau.

LES RÉSULTATS DE L'ÉPREUVE DE L'ANNEAU POUR LA BRUCELLOSE PERMETTENT DE RECERTIFIER UNE ZONE

Toute zone qui a été certifiée une fois à la suite d'une épreuve de sang peut être recertifiée pour une période de trois ans en vertu de ce programme pourvu que des échantillons de lait ou de crème de tous les troupeaux aient été éprouvés au moins trois fois par année sur une période de trois ans.

QU'EST-CE QUE L'ÉPREUVE DE L'ANNEAU POUR LA BRUCELLOSE?

C'est une épreuve exécutée à partir d'échantillons de lait ou de crème. Les vaches infectées de brucellose produisent des anticorps qu'on appelle agglutinines. Ces agglutinines sont éliminées dans le lait. Lorsque du lait contenant des agglutinines brucelliques est mélangé avec un antigène spécifique coloré, il se produit une réaction qui permet de dépister l'infection dans un troupeau. Cette réaction se manifeste par l'apparition d'un anneau bleu dans l'échantillon.

EST-CE QUE L'ON RECUEILLE DES ÉCHANTILLONS À TOUTES LES LAITERIES ET À TOUTES LES BEURRERIES?

Oui, et ce à intervalles réguliers et pour chaque fournisseur. Lorsqu'un propriétaire de troupeau expédie du lait à plus d'un établissement, ou qu'il expédie au nom de son fils, ou de son frère, ou de sa femme, on créditera les épreuves à son troupeau

WHAT HAPPENS IF MILK FROM YOUR HERD GIVES A SUSPICIOUS REACTION TO THE TEST?

Federal Health of Animals Branch inspectors will visit you to discuss the test results.

WILL YOUR ENTIRE HERD HAVE TO BE TESTED?

No, only the lactating females.

DOES THIS PROGRAM ELIMINATE TESTING ON YOUR FARM?

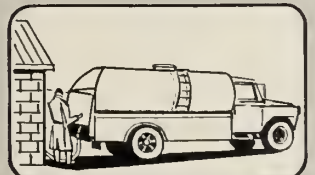
Yes, with only three exceptions:

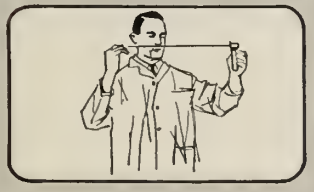
1. If infection is traced to your herd and it is subsequently found to be infected with brucellosis.
2. Unless there is a record of at least three brucellosis ring tests per year on your herd for the past three-year period.
3. Unless 15 percent of your breeding cows were tested under the Market Cattle Testing program during the same period, your herd will have to be blood-tested.

DISTRICT VETERINARIAN BRANCH OFFICES

HEALTH OF ANIMALS BRANCH

BRITISH COLUMBIA—1001 West Pender Street, Room 801, Vancouver 1, B.C.
ALBERTA—403 Public Building, Calgary, Alta.
SASKATCHEWAN—828 Motherwell Building, Regina, Sask.
MANITOBA—613 Dominion Public Building, Main & Water Streets, Winnipeg, Man.
ONTARIO—Dominion Public Building, 1979 Weston Road, Weston, Ont.
QUEBEC—400 Youville Square, Room 715, Montreal 1, Que.
ATLANTIC PROVINCES—Room 423 Federal Building, 1081 Main Street, Moncton, N.B.





pourvu que le vétérinaire local soit au courant des transactions.

OÙ SONT ÉPROUVÉS LES ÉCHANTILLONS DE LAIT?

Les épreuves sont effectuées par un personnel compétent à différents laboratoires maintenus par la Direction de l'hygiène vétérinaire.

QU'ARRIVE-T-IL LORSQUE LE LAIT D'UN TROUPEAU DONNE UNE RÉACTION DOUTEUSE À L'ÉPREUVE?

Les inspecteurs de la Direction de l'hygiène vétérinaire visitent le propriétaire pour discuter avec lui des résultats de l'épreuve.

FAUT-IL SOUMETTRE TOUT LE TROUPEAU À L'ÉPREUVE DU SANG?

Non, on éprouve seulement les vaches en lactation.

CE PROGRAMME SUPPRIME-T-IL LES PRISES DE SANG À LA FERME?

Oui, excepté dans les trois cas suivants:

1. Lorsque retraçant une infection, on découvre qu'un troupeau est atteint de brucellose.
2. Lorsqu'un troupeau n'a pas subi au moins trois épreuves de l'anneau par année au cours des trois dernières années.
3. Lorsque moins de 15 p. cent des vaches adultes du troupeau ont été éprouvées sous le programme de l'épreuve des bovins de marché au cours des trois dernières années.

BUREAUX DES VÉTÉRINAIRES RÉGIONAUX

DIRECTION DE L'HYGIÈNE VÉTÉRINAIRE

COLOMBIE-BRITANNIQUE—1001 West Pender Street, Room 801, Vancouver 1 (C.-B.)
ALBERTA—403 Public Building, Calgary (Alb.)
SASKATCHEWAN—828 Motherwell Building, Regina (Sask.)
MANITOBA—613 Dominion Public Building, Main and Water Streets, Winnipeg (Man.)
ONTARIO—Dominion Public Building, 1979 Weston Road, Weston (Ont.)
QUÉBEC—400, place d'Youville, Pièce 715, Montréal (1re) (Québec)
PROVINCES DE L' ATLANTIQUE—Room 423, Federal Building, 1081 Main Street, Moncton (N.-B.)

Des échantillons de lait sont prélevés puis expédiés à un laboratoire fédéral de la Direction de l'hygiène vétérinaire, afin d'être soumis à l'épreuve de l'anneau pour la brucellose.

After milk from the farm has been shipped to the dairy, samples are collected and sent to a federal Health of Animals Branch laboratory for the brucellosis ring testing.

ECHO

NOTES AND COMMENTS FROM THE FIELD

ALBERTA WINTER WHEAT SURVIVES—Hard red winter wheat in Southern Alberta survived last winter's extreme cold better than had been expected. Crops were seeded later than usual last fall, and did not grow or develop as much as they should have done by freeze-up. Also, lack of snow cover during the last week of December exposed the grain to very low temperatures.

Despite these difficulties, the varieties "Winalta", "Kharkov 22 MC", and "Yogo" generally lived through the winter in the areas recommended for growing winter wheat. A differential winterkill was obtained in the experimental plots at Lethbridge so we were able to select hardy lines and varieties. The above-mentioned varieties survived but "Jones-Fife" and "Gaines" were almost completely winterkilled.

These results support our contention that "Gaines", a soft white winter wheat, is best adapted to British Columbia, but is a hazardous choice for Southern Alberta. Many of the hybrid lines from the breeding program had a high level of survival. Some of the Russian introductions are very winterhardy and appear promising as parental material.—M. N. GRANT, LETHBRIDGE, ALTA.

MORE WATER, LEANER PIGS—Pigs usually drink from 2.5 to 3 lb. of water per lb. of feed, but recent experiments at this station showed that when they don't get all the water they want, they may lay on too much fat.

In two experiments, they were restricted to 1.25 lb. water per lb. of feed. They stored up to 11 per cent more fat than their litter-mate controls, who got as much feed, but 3 lb. water per lb. of feed.

In the third they were allowed only 2 lb. water and stored up to 5 per cent more fat than the controls, whose water was unrestricted.

It is well known that if water intake of an animal is restricted, it will eat less and grow more slowly. But this is the first time it has been shown that if two animals get the same amount of feed, with one being restricted on water, the one getting the least water will store more fat. The growth of lean tissue does not seem to be greatly affected.

"Pipeline feeding" (feed and water premixed in a gruel), is becoming more and more popular. When water is not provided for otherwise, this system often results in a tendency to under-estimate a pig's water requirement.—H. M. CUNNINGHAM, NAPPAN, N.S.

TANDIS QUE LES GRAMINÉES, mil, dactyle, fétuque, et pâturin, exerçaient des actions différentes sur la quantité et la qualité de l'humus après quatre ans de culture sur le loam argileux Du Creux, la luzerne, le lotier et le trèfle alsike n'avaient pas modifié de façon différente l'humus du loam schisteux St. André après deux ans en culture. Il semble que le temps est un élément important dans l'action des plantes sur l'évolution de l'humus dans le sol, élément qui'il faut considérer dans les études sur l'interaction des plants et de l'humus.—F. W. PAULI ET J. M. GIRARD, LA POCATIÈRE, P.Q.

SCREENING IMPORTED FRUIT TREES AND VINES—A Canadian Post Entry Quarantine and Indexing Station for screening imported fruit trees and vines is being developed at the CDA Saanichton Experimental Farm on Vancouver Island. It is the combined effort of the CDA Research Branch and the Plant Protection Division of the Production and Marketing Branch. With these new facilities, the department will be able to provide the tree fruit and grape industries with better protection from disease.

Prevention of plant disease is cheaper and easier than control after it has become established. Therefore, it is best to make sure that disease is not brought into a continent, country or region.

The station will screen fruit trees and grape vines being imported from other countries. Imports from remote regions by research workers for variety testing and breeding programs will be closely examined to be sure they aren't smuggling in new diseases that would damage or destroy fruit plantings.

The station will also test varieties and rootstocks developed by Canadian plant breeders. This will guard against their carrying hidden viruses that could cause trouble when released to growers for commercial planting.—M. F. WELSH, SUMMERLAND, B.C.

IMPROVED TURKEY ROLLS—A new method of processing turkey rolls has been developed by the Food Research Institute of the Canada Department of Agriculture in co-operation with the department's Poultry Division. The new method, being patented, will enable homemakers, restaurants and hospital-type institutions to serve hot turkey for meals without losing the convenience of precooked turkey rolls. Also, the rolls are more attractive in appearance, and can be sliced and served hot.

Dr. Moustafa Aref and Dr. Norman Tape, the scientists responsible for the new technique, say that it eliminates the need for an added binding agent, and the limitations this causes.

Even the smallest processing firm can use this simple method. After boning and trimming, whole pieces of turkey meat are beaten gently to force some natural tissue fluid to the surface. The pieces are compressed into containers for cooking, and the resulting rolls frozen. During the cooking, the fluid on the meat coagulates and binds the pieces of compressed meat together so well that a roll will remain intact even when sliced at a temperature of 200 degrees.

Up to now, pre-cooked turkey rolls have been produced with the use of a gelatin binder which melted if the roll was heated before being used. Because of this, a roll could be sliced only while cold and the slices could be warmed only slightly before being served.

The new process requires only 80 minutes cooking time, compared with 4½ hours for the binder method.

SEEDER AND FERTILIZER APPLICATOR—A major problem in soil fertility work with row crops is to obtain accurate within-row distribution of fertilizer and accurate placement in relation to the seed. This problem is enhanced when several row widths and fertilizer placement positions are required for different crops.

At the CDA Experimental Farm, Agassiz, B.C., this problem has been partially overcome. In cooperation with the Engineering Section, Experimental Farm, Swift Current, a four row precision seeder-fertilizer applicator was built. Four cones for metering fertilizer were constructed and mounted above a Webb tool bar with a three-point hitch and four modified Webb seeders. The drive mechanism operates from a PTO matched to ground speed, then through appropriate gears. Fertilizer is uniformly distributed for 17- or 25-foot rows and seeds are spaced accurately within the row. The machine weighs 1,100 lb. and is 11 ft. 4 in. wide, but is versatile and rapidly changed for different row widths, and seed and fertilizer placements.

The machine was used in 1965 to seed peas and three varieties of corn, and to place fertilizer for peas, beans, potatoes and five varieties of corn. With appropriate selector wheels many seeds

Three Canada Department of Agriculture publications have won awards in the 1966 communications contest sponsored by the American Association of Agriculture College Editors. The technical bulletin "Farm Sprayers", and the quarterly "Research for Farmers", won blue ribbons with the rating "excellent", and the consumer-oriented booklet "Poultry—How to Buy, How to Cook", won a red ribbon for "good".

Trois publications du ministère de l'Agriculture du Canada ont remporté des honneurs lors du concours des communications pour 1966. Le tout était sous la juridiction de l'Association Américaine des rédacteurs de Collèges d'Agriculture. «Pulvérisateurs agricoles» et «Research for Farmers» ont mérité la mention «Excellent» avec rubans bleus; la publication «Volaille: achat, cuisson» destinée aux consommateurs recevait la mention «Bien» accompagnée du ruban rouge.

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which are relatively round, and possibly others, could be accurately seeded. Further tests are being made with this machine.—V. W. CASE, AGASSIZ, B.C.

HERBICIDES—Ornamental plots of transplanted alyssum, cosmos, petunia and phlox drummondi were particularly floriferous and free from weeds at the CDA Experimental Farm, Fredericton, where the ground was treated with the granular formations of Simazine at 1 lb. active per acre, of Amiben at 5 lb. per acre, EPTC at 8 lb. per acre and a spray of Sesone 4 lb. per acre. Results with ageratum, marigold and zinnia were reasonably similar but masked by seasonal influences that affected interpretation. Weed control was generally good for eight weeks.—R. G. WHITE, FREDERICTON, N.B.

BURN OF BURLEY TOBACCO—Burley tobacco grown by different cultural practices at this station in 1960 and 1961 and aged in bulk until 1965 burned at different rates of time per unit of tobacco in cigarettes. The average rate of burn for four grades of new culture tobacco (close spacing, high topping and late suckering) was 20 per cent faster than equivalent grades of old culture tobacco (wide spacing, low topping and clean suckering), the average times being 282 and 355 seconds per inch of cigarette respectively.

All grades of leaf tested from the bottom to the top of the plants of new culture tobacco burned faster than the equivalent grades of old culture tobacco, but the differential ranged from 18 per cent faster burn for bottom leaves to 35 per cent faster burn for top leaves.

The combustibility of burley tobacco is an important factor in its use for cigarette and pipe tobacco.—W. A. SCOTT, HARROW, ONT.

NOUVEAU MODE DE PRÉPARATION DU ROULÉ DE DINDE—Grâce à une nouvelle technique mise au point par le ministère de l'Agriculture du Canada, les cuisinières, les restaurants et les institutions comme les hôpitaux pourront servir du dindon chaud aux repas tout en profitant de la commodité du dindon roulé précuit.

Mise au point par l'Institut de recherches sur les aliments et la Division de l'aviculture du ministère de l'Agriculture du Canada, cette nouvelle méthode permet d'obtenir du dindon roulé qui est plus attrayant et qui peut être tranché et servi chaud.

D'après les chercheurs, les docteurs Moustafa Aref et Norman Tape, qui ont mis à point le nouveau procédé, leur technique élimine le besoin d'ajouter un liant ainsi que ses inconvénients.

Ils font remarquer que leur procédé est tellement simple qu'il peut être utilisé même par un établissement de conditionnement de moindre importance. Après le désossement et le parage, on bat légèrement des morceaux entiers de chair de dindon pour faire venir à la surface une certaine quantité de liquide qui se trouve dans les tissus. Les morceaux sont comprimés dans des contenants pour la cuisson et le roulé qui en résulte est ensuite congelé. Au cours de la cuisson, le liquide de la viande se coagule et lie si bien les morceaux de viande qu'un rouleau peut demeurer intact même lorsqu'il est tranché à une température de 200 degrés.

Jusqu'à présent, on se servait, pour la préparation du dindon roulé précuit, d'un liant à base de gélatine qui fondait si le morceau roulé était chauffé avant d'être employé. De ce fait, un morceau roulé ne pouvait être tranché qu'à l'état froid et les tranches ne pouvaient être réchauffées que légèrement avant d'être servies.

Grâce à la nouvelle technique, on a résolu un autre problème résultant de l'emploi d'un liant à base de gélatine, puisqu'on supprime l'apparence des morceaux roulés qui étaient moins appétissants.

Cette innovation permet aux établissements de conditionnement de réduire considérablement la période de temps requise pour la cuisson, soit à 80 minutes, comparativement à quatre heures et demie lorsqu'on se sert du liant.

ERRATUM NOTE

Re Echo item "Tillage to Eradicate Couchgrass", page 16, CANADA AGRICULTURE, Summer, '66, the first sentence should have read "Tillage alone during a one-year period . . ." instead of ". . . a one-day period". Also, "1956" in first line, first item, first column, page 16, should have read "1965".

UN EXCÈS DE MANGANÈSE PEUT ÊTRE TOXIQUE À LA POMME DE TERRE . . .

H. GÉNÉREUX ET G. J. OUELLETTE

L'introduction de nouvelles variétés de pommes de terre est certes un bienfait pour l'agriculture. Cependant, des variétés plus ou moins bien adaptées peuvent être infectées par des pathogènes ou manifester des troubles physiologiques, occasionnés par un excès ou une carence d'un élément du sol.

L'apparition d'une nécrose sur la variété Keswick dans la région de La Pocatière suscita une enquête qui a été faite de 1957 à 1959 dans l'Est du Québec au cours de la saison de végétation. Cette enquête a démontré que la moitié des 112 champs de pommes de terre visités contenaient un excès de manganèse soluble. La plupart des champs, contenant plus de 4 p.p.m. de manganèse échangeable, ont exhibé des symptômes variables d'intoxication manganique sur le feuillage, notamment sur celui de la variété Keswick.

Cette enquête révéla aussi qu'il existait un rapport très étroit entre le pH du sol et la fréquence de même que l'intensité de la nécrose manganique. En effet, plus de 80 p. cent des champs d'un pH inférieur à 4.8 ont dénoté la présence de symptômes nécrotiques provoqués par un excès de manganèse. D'autre part, ce trouble physiologique n'a été observé que dans 12 p. cent des sols ayant un pH supérieur à 5.3.

A l'aide d'une échelle de pointage où le chiffre 0 indiquait l'absence de nécrose et la valeur 5 était synonyme de nécrose grave, nous avons noté que l'indice nécrotique moyen était de 3.4 pour les sols à pH inférieur à 4.8 et de 0.3 pour les sols dont le pH était supérieur à 5.3. De plus, le pourcentage et l'indice de nécrose étaient plus prononcés sur le feuillage des pommes de terre cultivées en sols sableux et graveleux que dans les sols de texture plus fine, bien que le pH et le contenu en maganèse échangeable fussent sensiblement les mêmes dans les trois groupes de texture de ces sols.

Durant le même temps, nous avons étudié les symptômes de nécrose en serre sur les variétés Keswick, Cherokee, Green Mountain, Katahdin, Kennebec et Norgleam, cultivées dans un milieu formé de sable de quartz additionné de solution nutritive et de manganèse à des concentrations de 0.5, 25 et 250 p.p.m. Ce milieu était maintenu à un pH de 4.8 afin de favoriser la solubilité du manganèse. Un examen des symptômes fait 35 jours après la transplantation des variétés dans un milieu contenant 250 p.p.m. de manganèse soluble révéla qu'à l'exception de la Norgleam, les tiges de toutes les variétés montraient

M. H. Généreux est phytopathologiste à la Station de Recherches, La Pocatière et M. G. J. Ouellette est professeur à la Faculté d'Agriculture de l'Université Laval, à Québec.

1. Symptômes de nécrose sur tige de Keswick.
2. Symptômes de nécrose sur folioles de Montagne Verte (à gauche) et Keswick (à droite).

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une nécrose quasi identique, caractérisée soit par des points minuscules brun foncé comme chez la Keswick (Fig. 1), soit par des lésions nécrotiques couvrant presque la totalité des tiges comme chez la Cherokee. On observait des taches brunâtres de dimension variable chez les autres variétés. Les pétioles de variétés Cherokee et Green Mountain étaient très cassants tandis que ceux des variétés Norgleam, Katahdin, Keswick et Kennebec l'étaient à un degré moindre. La nécrose, observée sur les pétioles, ressemblait à celle des tiges.

Chez les variétés Green Mountain, Katahdin et Kennebec, on observa des taches brunâtres et des stries nécrotiques sur le limbe des folioles, des taches grisâtres sur le limbe des variétés Cherokee et Norgleam, de petits points brun foncé sur le limbe et un noircissement des nervures chez la variété Keswick (Fig. 2). La variété Keswick semblait donc plus sensible que les autres variétés à l'intoxication manganique.

Ces variétés furent plantées dans un champ constitué de loam graveleux St-André, d'un pH de 4.7 et contenant 8 p.p.m. de manganèse échangeable. Comme nous considérions que ce sol représentait un traitement d'intoxication manganique légère, nous y avons ajouté deux traitements, soit 50 et 500 kilos de sulfate de manganèse à l'hectare, appliqué avant le hersage. Un engrais de 8-16-16 fut appliqué dans le sillon au taux de 1600 kilos à l'hectare.

L'examen a été fait 12 ou 13 semaines après la plantation afin de détecter les symptômes sur le feuillage. Sans addition de manganèse au sol, la Norgleam est exempte de nécrose et les autres variétés sont légèrement nécrosées. Avec addition de manganèse, les variétés Cherokee et Keswick sont plus sensibles à l'intoxication du fait qu'elles absorbent plus de manganèse. Pour une variété donnée, il existe une relation très étroite entre l'indice de nécrose et la teneur des feuilles en manganèse, mais des doses de manganèse à peu près analogues chez plus d'une variété ne correspondent pas nécessairement à des indices de nécrose analogues. Compte tenu de la variété, nous considérons que la teneur du feuillage en manganèse constitue un meilleur critère que l'indice de nécrose pour apprécier la gravité de l'intoxication manganique sur la pomme de terre.

Il est bon de signaler que la réaction des variétés à l'égard d'un excès de manganèse est extrêmement variable. Cette variation s'est concrétisée dans la nature des symptômes, mais pas toujours dans les rendements. En effet, nous n'avons pu observer de parallélisme entre la gravité des symptômes et la diminution des rendements.

Soulignons que la présence d'une forte teneur en azote a permis de réduire les dommages dûs à un excès de manganèse. Sous nos conditions, l'addition de 160 kilos d'azote à l'hectare a doublé les rendements et réduit d'un peu plus de la moitié l'indice de nécrose en comparaison des rendements obtenus avec 40 kilos.

D'autre part, l'addition de chaux a produit de bons effets sans toutefois corriger totalement l'intoxication manganique sur la variété Keswick. L'apport de chaux à raison de 600 kilos à l'hectare a aussi augmenté les rendements. Dans nos conditions, une forte application de fertilisant, soit de 1600 à 2400 kilos à l'hectare a eu pour effet de favoriser le développement de la brûlure hâtive. A ce taux de fertilisation, la maladie est plus prononcée sur la variété Keswick que sur la variété Green Mountain. D'autre part, les traitements qui ont eu pour effet de réduire la toxicité causée par le manganèse ont aussi minimisé le développement de la brûlure hâtive.

Bref, cette étude a démontré que l'application d'un engrais riche en azote est recommandable dans les sols où le manganèse est en excès et que l'addition de chaux a pour effet d'annihiler en grande partie la nécrose provoquée par une intoxication manganique et d'augmenter les rendements. Les recherches en cours indiqueront si l'apport de chaux aux sols à pH 5.0 aura pour effet de favoriser la gale commune.

FEDERAL CROP INSURANCE

NEW LEGISLATION PROTECTS RISING PRODUCTION COSTS

Farming is rapidly becoming big business. Production costs are rising; so are investments in farm crops. Because of this farmers are finding that they cannot afford to be without adequate crop insurance.

The Federal Crop Insurance Act passed in 1959, amended in 1964 and again in 1966 brings protection to farm crops. The 1966 amendments give the farmer higher crop protection to cover rising production costs.

The Canada Department of Agriculture can enter into an agreement with any province to make contributions towards the premiums, and the cost of administration of crop insurance programs.

One of the most important changes introduced in 1966 permits maximum coverage for any crop to be raised from the old level of 60 per cent of the long term average yield to 80 per cent.

The established value of each crop is determined by a method agreed upon by the federal and provincial governments. The long-term average, or normally expected yield of an insured crop in any area, and an area can be small as an individual farm if adequate records are available, is calculated in a manner approved by the Canada Department of Agriculture. In arriving at the normally expected yield, different periods of time may be used depending largely on yield records available.

The second major amendment increases the premium share payable by the federal government from 20 per cent to 25 per cent of the total premium. For example, assume that the premium for an insurance policy is one dollar an acre. Under this new amendment the farmer will now pay only 75 cents. The federal government pays the remaining 25 cents, or 25 per cent of each insured farmers premium.

A third amendment meets producers needs for protection, not only for the actual crops, but for production units such as fruit trees and perennial plants which produce crops. This amendment to the Act will make it possible for an insurance program to provide a measure of financial assistance that will permit the producer to replace the production units lost through natural causes, beyond control of the farmer. It will also make possible assistance towards the costs of maintenance of such units until normal production is resumed. The producers, then, would not suffer direct financial loss over several years while having to replace lost trees.

The original Act only provided assistances for programs covering the insurance of actual crops. Crops were defined in the regulations as follows:— wheat, oats, barley, rye, flaxseed, grain corn, buckwheat, soybeans, potatoes, sugar beets, tobacco, sunflower seed, rapeseed, apples, pears, peaches, plums, cherries and apricots.

Other crops can be added by amendment of the regulations.

A fourth amendment in the 1966 legislation covers a similar problem. In certain cases land that has been summerfallowed during the previous year cannot be seeded because of natural causes beyond the control of the farmer. The farmer thus stands to lose the costs of summerfallowing as there is no income from crop in that year. Now, under the new extended coverages it will be possible for a province to make available, insurance, which will compensate such farmers for the costs involved in the preparation of summerfallow land which cannot be seeded.

The original federal Act provides for loans to the provinces, in years when indemnities (claims) exceed money available. Provinces can borrow 75 per cent of the amount which claims exceed total premium receipts, cash reserves and a fixed $200,000. As an alternative to the loan feature, provinces may reinsure a portion of the provincial risk with the federal government.

The Act also provides that the federal government may reimburse the provinces for 50 per cent of their administration costs on any crop insurance program.

There is no compulsory feature in federal crop insurance but it is believed that at least 25 per cent of the farmers in an area must participate in order to

(Continued on page 22)

L'ASSURANCE-RÉCOLTE

LA LOI FÉDÉRALE MODIFIÉE FAIT FACE AUX HAUSSES DES FRAIS DE PRODUCTION

L'agriculture devient une entreprise à grande échelle. Les frais de production sont à la hausse; les cultures demandent des investissements de plus en plus considérables. Une assurance-récolte appropriée n'est donc pas un luxe mais un besoin.

La loi fédérale sur l'assurance-récolte adoptée en 1959 et modifiée en 1964, a de nouveau été revisée en 1966 en vue de faire face aux hausses des frais de production.

Le ministère de l'Agriculture du Canada peut en vertu d'ententes avec les provinces, contribuer 25 p. cent du coût des primes et 50 p. cent des frais administratifs des programmes d'assurance-récolte.

L'une des principales modifications apportées en 1966, permet d'augmenter la valeur assurable maximum de 60 à 80 p. cent du rendement moyen à long terme.

La valeur déterminée de chaque récolte est calculée selon une entente entre les gouvernements fédéral et provinciaux. Le rendement moyen à long terme, c'est-à-dire le rendement normal prévu, d'une récolte assurée, dans une région quelconque (même une seule ferme, si les données requises sont disponibles), est calculé d'après une formule approuvée par le Ministère. Les périodes qui servent à ce calcul peuvent varier, selon les données disponibles.

Le deuxième amendement principal a porté de 20 à 25 le pourcentage du coût global des primes, défrayé par le gouvernement fédéral. Si, par exemple, la prime d'une police est de $1 l'acre, le cultivateur ne paiera que 75c. et le gouvernement fédéral, les 25c. qui restent.

Un troisième amendement prévoit la protection non seulement des récoltes mêmes, mais aussi des plantes vivaces et des arbres fruitiers qui les produisent. L'assurance-récolte facilitera le remplacement des plantes vivaces et des arbres dans le cas de pertes occasionnées par des causes naturelles, de même que l'entretien jusqu'au moment où la production recommence. Les producteurs n'encaisseraient donc pas de pertes directes au cours des années où ils auront à refaire leur verger.

Au début la Loi ne prévoyait que l'assurance des récoltes suivantes: blé, avoine, orge, seigle, graine de lin, maïs à grain, sarrasin, fèves soja, pommes de terre, betteraves à sucre, tabac, graine de tournesol, graine de colza, pommes, poires, pêches, prunes, cerises et abricots.

Les règlements peuvent être modifiés en vue d'ajouter d'autres cultures à cette liste.

Un quatrième amendement apporté en 1966 touche les jachères. Dans certains cas, des terres laissées en jachère l'année précédente, ne peuvent pas, pour des causes naturelles, être ensemencées; les provinces peuvent maintenant offrir de l'assurance qui dédommagerait les cultivateurs.

La Loi prévoit des prêts aux provinces, les années où les indemnités excèdent les fonds disponibles. Les provinces peuvent alors emprunter 75 p. cent de la différence en plus entre les indemnités et les primes, les réserves en espèces et un montant fixé à $200,000. Au lieu du prêt, les provinces peuvent réassurer avec le gouvernement fédéral, une partie de leurs risques.

L'assurance-récolte est facultative. Néanmoins, on croit généralement que le bon fonctionnement du programme n'est possible que si 25 p. cent au moins des cultivateurs de la région y participent; c'est le minimum de participation stipulé en vertu des divers accords.

En général, les provinces ont décidé qu'un programme d'assurance-récolte peut être trop coûteux, au début surtout, pour être entrepris sans aide fédérale.

PLANS D'ASSURANCE-RÉCOLTE DES PROVINCES

L'élaboration et la mise en vigueur des programmes particuliers d'assurance-récolte relèvent des gouvernements provinciaux. Les détails au sujet, par exemple.

(*Suite à la page*)

provide for a sound program, and the various agreements presently in effect provide for this level of participation.

Generally the provinces have decided that the potential liabilities involved, particularly in the initial stages of any scheme, would be such that the risk would be too large for any province to take without federal support.

CROP INSURANCE PLANS IN THE PROVINCES

The development and implementation of specific crop insurance programs is carried out by the provincial governments. The details of the various insurance programs such as the areas to which insurance shall apply, the crops to be insured, the maximum coverages permitted, and the premium rates which shall apply, are covered in agreements between the federal and provincial governments.

Manitoba, Saskatchewan, Alberta and Prince Edward Island have federal-provincial crop insurance programs. Ontario has signified its intention to begin a crop insurance program for winter wheat and forage crops, to be expanded to other crops later. Quebec at present is developing a program suitable for farmers in that province.

In Manitoba: crop insurance was introduced in 1960. Its program insures wheat, oats, barley, flax, and sugar beets. Last year, 8,610 farmers bought insurance totalling $18,717,000. To date, premiums have exceeded indemnities by $1,100,000. Preliminary figures for 1966 show that 13,000 farmers had insured their crops for $30,000,000.

In Saskatchewan: crop insurance was introduced in 1961. Last year, 3,172 farmers bought $4,565,687 worth of coverage for wheat, oats, and barley. Reserves now total $850,000. In 1966, so far about 7,000 farmers have purchased about $12,000,000 worth of insurance.

In Alberta: crop insurance was introduced in three test areas in 1965 for wheat, oats, and barley; 1,312 farmers participated. Total coverage was $3,139,000; premiums exceeded indemnities by about $250,000. In 1966, to date, 4,500 Alberta farmers have bought about $13,400,000 worth of crop insurance.

Prince Edward Island's program commenced in 1962. It provided $440,859 worth of coverage in 1965 for potato and grain crops on 267 farms. Indemnities exceeded premiums by about $39,000.

ADVANTAGES OF CROP INSURANCE

Crop insurance protects money invested in crops against losses due to natural causes beyond the control of the farmer. It spreads losses over large areas, and many years. Annual premiums are substituted for unpredictable losses.

Crop insurance cushions the shock of financial loss. Most farmers have a major investment in the crops they grow. They must borrow money to buy fertilizer, seed, gasoline, insecticides and modern farm equipment. A sudden crop loss often means the farmer cannot repay his loans. This exhausts a farmer's credit. It leaves him without further means of financing. But, if he has crop insurance, he can offer it as additional security, for loans to repay his loss from crop failure.

Crop insurance also gives confidence to invest in the use of modern farm practices to increase crop yields.

It helps insure stability of farm income and strengthens the economy.

Crop insurance gives the farmer a contractual right to assistance in the event of crop failure.

CROP INSURANCE HIGHLIGHTS

The federal Crop Insurance Act now offers greater advantages and benefits to the Canadian farmer through provinces that participate in the program. At present the Canada Department of Agriculture will undertake with the provinces to:

1. Insure crops for up to 80 per cent of their average long-term, or normally expected yield.
2. Contribute 25 per cent of the farmer's premium.
3. a) Insure crops named in the Federal Act.
   b) Insure fruit trees and perennial plants which produce insurable crops.
4. Insure the cost of preparing summerfallow land which cannot be seeded due to natural causes.
5. Reimburse half the provinces' administrative costs.
6. a) Lend a province money in years when insurance claims exceed the amount of money in reserve, or
   b) Allow provinces to reinsure a major part of their liability with the federal government.

des régions et des récoltes admissibles, de la protection maximum à accorder et des primes font l'objet d'ententes fédérales-provinciales.

Le Manitoba, la Saskatchewan, l'Alberta et l'Île du Prince-Édouard ont adopté des programmes fédéraux-provinciaux d'assurance-récolte. L'Ontario se propose d'assurer le blé d'hiver et le fourrage puis d'étendre son programme à d'autres récoltes. Le Québec aussi prévoit l'introduction d'un programme.

En 1960 le Manitoba a assuré ses récoltes de blé, d'avoine, d'orge, de lin et de betteraves à sucre. L'an dernier, 8,610 cultivateurs ont assuré leurs récoltes pour un montant de $18,717,000 d'assurance; les primes ont dépassé les indemnités de $1,100,000 et, en 1966, 13,000 cultivateurs ont assuré leurs récoltes pour $30,000,000.

L'ASSURANCE-RÉCOLTE—EN BREF

La Loi fédérale sur l'assurance-récolte offre maintenant, par l'intermédiaire des provinces, de nouveaux avantages au cultivateur canadien. De concert avec les provinces, le ministère de l'Agriculture du Canada prévoit:

1. L'assurance des récoltes pour une valeur allant jusqu'à 80 p. cent du rendement moyen à long terme (rendement normal prévu).
2. Le défraiement de 25 p. cent du coût des primes.
3. a) L'assurance des récoltes énumérées dans la Loi.
   b) L'assurance des arbres fruitiers et des plantes vivaces qui produisent des récoltes assurables.
4. L'assurance des frais de jachère quand les causes naturelles empêchent l'ensemencement du terrain l'année suivante.
5. Le remboursement de la moitié des dépenses administratives encourues par les provinces.
6. a) Des prêts aux provinces, les années où les indemnités excèdent les montants en réserve, ou
   b) la réassurance d'une grande partie des risques encourus par les provinces.

L'assurance-récolte fut introduite en Saskatchewan en 1961. En 1965, 3,172 cultivateurs ont protégé leurs récoltes de blé, d'avoine et d'orge pour une valeur de $4,565,687. Les réserves s'élèvent maintenant à $850,000. En 1966, quelque 7,000 cultivateurs ont acheté pour $12,000,000 d'assurance.

En 1965, l'Alberta inaugurait dans trois régions-pilote, un programme d'assurance pour le blé, l'avoine et l'orge: 1,312 cultivateurs ont couvert leur récolte pour une valeur de $3,139,000; les primes ont dépassé les indemnités de $250,000. En 1966, 4,500 cultivateurs ont assuré leurs récoltes pour $13,400,000.

Le programme d'assurance de l'Île du Prince-Édouard a débuté en 1962. L'an dernier, 267 cultivateurs ont assuré leurs récoltes de céréales et de pommes de terre pour un montant de $440,859. Les indemnités ont dépassé les primes de $39,000.

AVANTAGES DE L'ASSURANCE-RÉCOLTE

L'assurance-récolte prémunit les agriculteurs contre les pertes dues à des causes naturelles.

Elle répartit les pertes sur de vastes régions et un certain nombre d'années. Le cultivateur peut ainsi, grâce au paiement des primes annuelles, parer aux pertes imprévisibles.

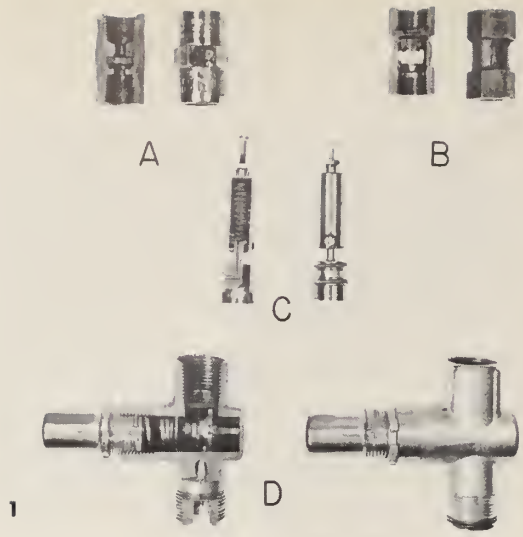
La plupart des cultivateurs ont investi des sommes considérables dans leurs cultures. Ils doivent emprunter pour acheter les engrais, les semences, le carburant, les insecticides et la machinerie. Une perte de récoltes met souvent le cultivateur dans l'impossibilité de rembourser ses emprunts; ceci coupe le crédit et le prive des moyens de financement futurs. Par contre une assurance-récolte peut servir de garantie supplémentaire.

L'assurance-récolte encourage le cultivateur à adopter avec confiance des techniques plus efficaces, aide à stabiliser son revenu et affermit l'économie du pays.

L'assurance-récolte donne aux cultivateurs un droit contractuel à l'assistance en cas de récolte manquée.

Insurance against crop losses to fruit trees and perennial plants which produce crops is available to farmers under an amendment to the Federal Crop Insurance Act. Under it, the government will give the farmer some financial help to replace production units lost through natural causes beyond his control.

Un amendement à la Loi fédérale sur l'assurance-récolte prévoit la protection des arbres et des plantes vivaces qui produisent des récoltes. Le gouvernement fédéral offre de l'aide financière pour aider le cultivateur à remplacer les arbres ou les plantes vivaces perdus.



REGULATORS IMPROVE SPRINKLER IRRIGATION SYSTEM

BY J. C. KORVEN

The application of water in a sprinkler irrigation system depends on the flow and pressure of water in the pipes. If the sprinkler pipe line runs up or down a hill the sprinklers at the bottom operate at higher pressure than those at the top. This variation in pressure produces an uneven application of water because the lower sprinklers deliver more water than the upper ones. In our tests at Swift Current, we found that this problem could be overcome by installing a regulator in each sprinkler riser pipe.

Here's a description of the regulators used in our experiment: Two of the four regulators, known as flow control valves, referred to as regulators A and B. These are available in different sizes designated by capacity in U.S. gal. per min. In regulator A the water flows through a single central hole in the diaphragm, the area of which changes as the pressure changes. In regulator B the water flows through 4 holes on the periphery of the joint between the cylindrical block and its seat. The area of the holes changes as the block is pressed against its seat by the pressure of the water. Neither of the regulators is adjustable. Regulator A can not be repaired; regulator B can be dismantled and repaired.

The other two, known as pressure regulators, are shown as regulators C and D. Each is activated by a spring and is available in only one size, but is adjustable. Regulator C can be preset by the manufacturer, whereas regulator D is set by the user to pressure settings marked on the adjusting knob. To adjust regulator C it is necessary to remove it from the riser pipe and use tools to loosen the locknut and turn the adjusting screw. Regulator D, on the other hand, can be adjusted by hand while in operation.

The cost comparison of the regulators is as follows: regulator D, $3.50; regulator A, $2.50; and regulators B and C, $2.00.

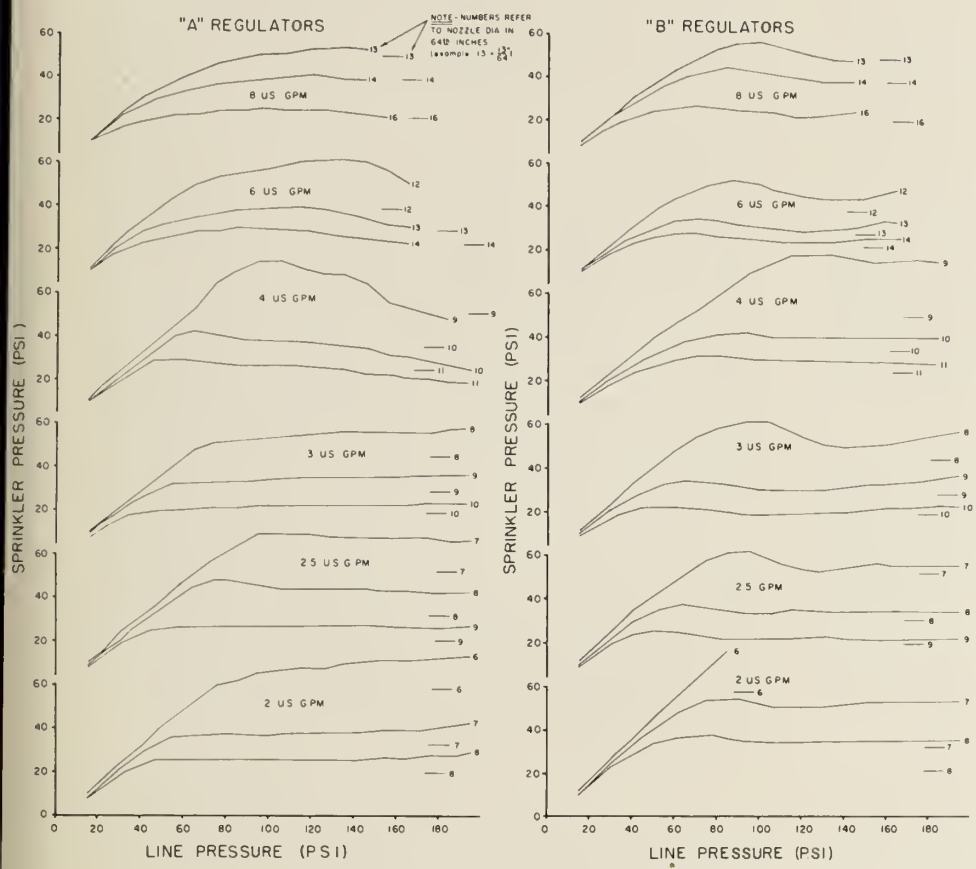
The author is an agricultural engineer with CDA Research Station, Swift Current, Sask., Alta.

HOW TESTS WERE DONE

The test equipment, shown in Fig. 2, included a pump, motor, piping, valves, pressure gauges, sprinkler regulator and drain. The pressure of the water flowing through the regulator was adjusted by means of a valve on the pump by-pass.

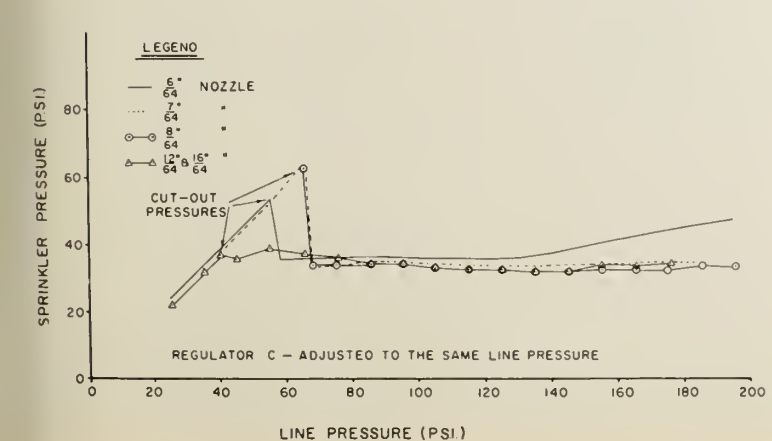
The test routine was to start at a line pressure (pressure at regulator) of 15 pounds per square inch (p.s.i.) and increase it in steps of 10 p.s.i. The line pressure and the corresponding sprinkler pressure were read and recorded for each step.

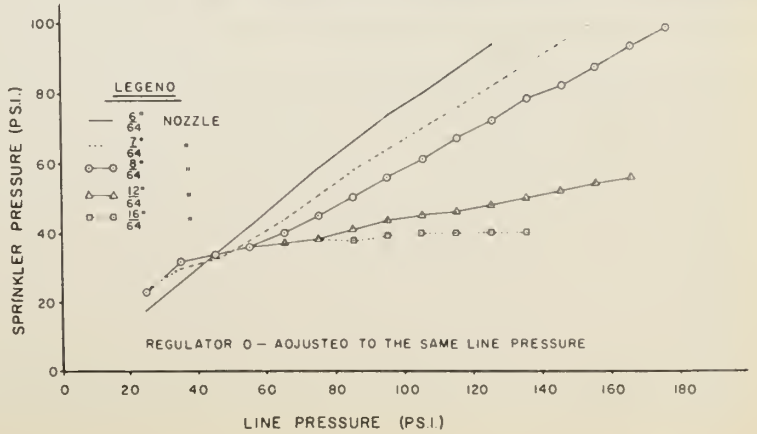
The regulators were evaluated over a range of nozzle sizes from 3/32 to ¼ in. in diameter in 1/64-in increments and pressures from 15 to 200 p.s.i. Regulators A and B were tested as received; regulator C as received at a preset pressure of 35 p.s.i., and also after adjustments were made; regulator D as adjusted according to the pressure settings on the adjusting knob.



The results of our studies may be summed up as follows:

1. The pressure drop across regulators A and B was 15 to 20 p.s.i. as compared to 3 to 5 p.s.i. for regulators C and D.
2. Regulators A, B, and C regulated the sprinkler pressures over the range of nozzle sizes used, whereas regulator D did not regulate until a nozzle size of 1/4—in. in dia. was reached.
3. The rated capacity of regulators A and B had to be matched to the nozzle size to obtain the desired sprinkler pressure.
   The following combinations are recommended:
   3/32—in. nozzle with the 1 3/4 g.p.m. valve
   7/64—in. nozzle with the 2 g.p.m. valve
   1/8—in. nozzle with the 2.5 g.p.m. valve
   9/64—in. nozzle with the 3 g.p.m. valve
   5/32—in. nozzle with the 4 g.p.m. valve
   13/64—in. nozzle with the 6 g.p.m. valve
   7/32—in. nozzle with the 8 g.p.m. valve
4. The quality of regulation was improved by adjusting the regulators C and D according to nozzle size. Adjustment of regulator when nozzle sizes smaller than 1/4 in. were used.
5. The regulators should be tested before putting them into field operation. Pretesting of regulators A and B detected defective ones, if any, whereas in the case of regulators C and D the main purpose was to adjust the regulator to the nozzle size.
6. Regulator D is the only one that can be adjusted while the sprinklers are in operation. This overcomes its weakness of regulating the sprinkler pressure over a relatively short range of line pressures at the one adjustment.
7. Regulator C as received from the factory was the least reliable of the four. The required pressure regulation coincided with the factory setting in only a few cases; in the majority of the cases the regulation was unsatisfactory (little, if any, pressure regulation). However, after a series of adjustments and tests, regulator C did provide pressure regulation comparable to regulators A and B. Regulator C has the advantage that one size covered the range of nozzles used in this study.





the diseases that were overlooked

VIRUSES IN APPLE TREES

"The number of diseases is a disgrace to mankind."

François de Salignac, Book XIII.

MAURICE F. WELSH

During the last ten years, in British Columbia as in other fruit-growing regions of North America, plant pathologists have become aware, quite suddenly, of a previously unrecognized group of diseases in apple trees. It has been a sobering experience to realize that in the mid-twentieth century diseases can still be overlooked.

A decade ago, tree fruit workers in all parts of the continent shared a comfortable assumption that viruses were of little importance in apple; despite experience, for 25 years or more, in studying the numerous viruses causing diseases of stone fruits, small fruits and grapes. Although several virus diseases were known in apple—mosaic, flat limb, and false sting—none of these was obviously important, and there was considered to be no evidence of other viruses in North American apple plantings.

In British Columbia, by 1955, we had developed a suspicion that apple virus diseases might be common and serious. In that year tests were initiated to determine whether these suspicions were well founded. Similar studies were begun in 1955 or 1956, quite independently, at several institutions in the United States.

During the intervening decade, the assembled results of these investigations have shown that almost all apple trees of most varieties in North American plantings are infected with one or more viruses, and that some of these viruses cause serious diseases. They induce a diversity of types of symptoms that can affect the leaves, the fruit, the bark and wood of branches and roots, and the growth habit of the tree. Viruses can also be present in many varieties without manifestation of any characteristic symptoms.

Dr. Welsh is Head, Plant Pathology Section, CDA Research Station, Summerland, B.C.

Ten years is a short period in which to become familiar with the characteristics of a group of diseases in a long-lived perennial crop such as the apple. Nevertheless, it has been long enough to assemble considerable knowledge of the types of symptoms on apple trees that are likely to be caused by viruses. It has also enabled us to begin characterizing the viruses themselves, to make assessments of their rates and means of spread, to study their host ranges, and to learn a little about interactions that occur among virus infections in the host plants.

In our investigations at the CDA Research Station, Summerland, B.C., we found that virus-induced leaf symptoms have proved almost invariably to be either yellow-green flecks associated with the veins, or ring patterns of the same color on the leaf lamina. The flecking symptoms are often accompanied by leaf puckering.

On the fruits, too, there is a tendency to express symptoms in ring patterns. These are most frequently rings of superficial russeting, but they may also be blotches of dark skin pigment, with or without depression of the blotched surfaces. Viruses may also cause dimpling, pitting, or distortion of the fruits, unaccompanied by russeting or blotching.

Our research has revealed that the most distinctive symptom on trunks, limbs and roots is a pitting and grooving of wood tissues that becomes apparent when the bark is lifted. Other virus diseases are characterized by bark blistering and cracking, or by the occurrence of pits of necrotic tissue in the inner layers of the bark. Often the bark necrosis is especially severe at the stock-scion junction. Wood pitting, when severe, seriously reduces the vigor of affected trees. Bark necrosis often leads to severe decline and eventual death of the trees.

1. Dr. Welsh demonstrates the effect of Rubbery Wood virus on apple trees.

One disease, rubbery wood, derives its name from the effects of reduced lignin content in the branches, which therefore lack rigidity and give the tree a weeping habit. Several other virus diseases are expressed as large swellings or depressions on the surfaces of trunks and limbs.

In our studies, we observed that few apple viruses appear to spread from tree to tree in the orchard, although there is limited evidence of slow orchard spread for several of them. Some of such spread must be attributed to transmission through natural root grafts between closely-planted trees. Apparently the widespread occurrence of viruses in apple plantings has resulted almost exclusively from the use of infected scionwood and rootstocks during the many decades when the presence of viruses in apple trees was not suspected.

We have discovered virus diseases in orchard trees of most of the common commercial apple varieties displaying remarkably similar fruit and foliage symptoms. Test transmissions that have been made among these varieties at Summerland have indicated that, despite the general similarity of the symptoms, almost all of these diseases are distinct, and must have originated independently.

Sensitive woody plants have been found that can serve as indicators of the presence of other groups of viruses, which occur commonly in commercial apple varieties and rootstocks but cause no symptoms except a suspected reduction of vigor.

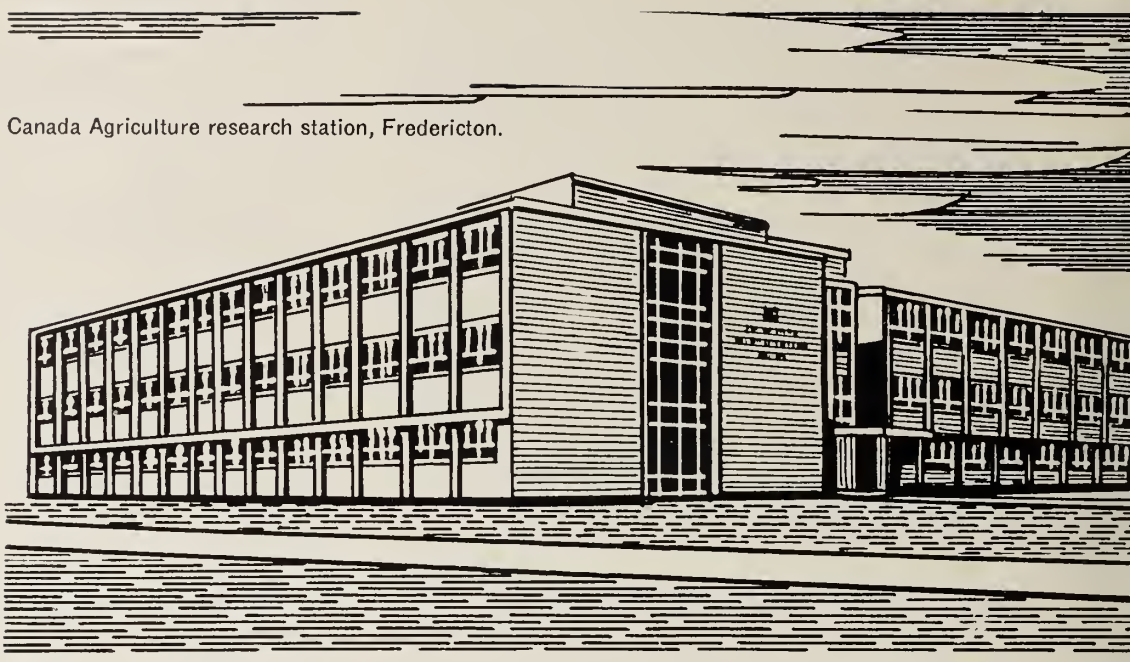
It seems remarkable that virus diseases of apple were not recognized sooner. Some of them may have appeared only recently. Nevertheless there is no doubt that most of them have been present in the orchards for many years; the symptoms or effects caused acknowledged to be unknown; or attributed to frost, insect, or pesticide injury; or considered to be the effects of minor element deficiencies.

This has been a decade of exploratory research on viruses in apple trees. There are signs that they are due to be subjected to a period of more sophisticated research in future. It is now known that most apple viruses can be eliminated very readily from infected tree tissues when they are exposed to periods of continuous dry heat. This technique is being used, not only to obtain clean apple clones for nursery certification programs, but for separations of viruses from mixed infections. Several apple viruses have been successfully transferred to herbaceous plants, and thereby made available for extraction, purification, and characterization by chemical and serological means. Finally, our research at Summerland has disclosed that certain viruses, which induce no disease symptoms themselves, can be introduced to susceptible varieties and can then provide them with protection against the viruses that cause serious symptoms on the foliage and fruit. These developments offer useful and interesting new avenues for extension of apple virus research, which should tell us much more about the viruses that infect this host, and could suggest improved means for controlling them.

As we seem to be coming to the end of the period of exploratory investigations, this is a logical time to assess the significance of the results obtained. It is true that we have been guilty of inflicting the fruit industry with the need to concern itself with a group of previously unrecognized diseases. However this is probably a small price to pay for the improved opportunity to diagnose baffling abnormalities in the orchards, and to adopt suitable means of preventing or controlling them.

2. "Mumps" of Winesap apple, characterized by large swellings at bases of pruning cuts and side branches, is very sensitive to killing in periods of cold weather.

3. The 7-acre Virus Research Orchard at Summerland is in an isolated location overlooking Okanagan Lake. Knowledge acquired of host ranges, levels of spread, and the behaviour of viruses in their tree fruit hosts, has made possible the development of preventive measures.



Canada Agriculture research station, Fredericton.

There are three types of potato quality, says the author. This story deals with the third—the internal characteristics that affect table stock when cooked.

H. T. DAVIES

What is potato quality? There are three correct answers. As far as seed potatoes are concerned, quality is taken to mean freedom from disease. Next, quality of table stock can refer to the outside appearance of the potato, influenced by such factors as amount of bruising, cuts, and fungus disease present, as well as size and shape of tubers. But we are concerned here only with the third type of quality—the internal characteristics that affect table stock when cooked.

The consumer, then sets the standards of quality, and ultimately there can be no objective method of judgment. Tastes vary by country and by individual, and quality requirements vary with the purpose for which the potatoes are to be used. Thus, early potatoes and late potatoes are judged by different standards. The criterion of quality for chipping differs from that for boiling; a variety suitable for salads would make poor bakers. Color, consistency, mealiness, structure, "sloughing", or the disintegration of the potato when boiled, flavor, and storage life all take on different degrees of importance, depending upon the product in question.

At the CDA Research Station in Fredericton, we have been tackling the problem of potato quality from several angles. First, the breeders select varieties or seedlings which bear tubers suitable for chipping or French frying or use on the table, and then cross these with varieties known for their disease resistance, high yield or early maturity, for example. The progenies of these crosses are then tested repeatedly to see that they are in fact superior to their parents.

It is well known that environment can influence quality, and consequently, in addition to the breeding program, much research on the influence of cultural practices—fertilizing, seed treatment, spraying for insects and disease, spacing, topkilling—is carried out and the results are passed along to the potato industry.

The association of specific gravity or dry matter content and cooking quality is well known. High specific gravity, associated with a high dry matter content, is normally considered to be indicative of good quality. Why, then, must we run cooking trials? After-cooking discoloration, a darkening process, is a serious problem for both processor and housewife, and it cannot be revealed by specific gravity tests alone. Then there is the problem of off-flavor. This becomes apparent only after cooking. Finally, although often linked with high specific gravity, the degree of "sloughing" can be evaluated accurately only by a cooking test.

In our investigations, we have found that an ideal potato after boiling will be white or creamy white in color, of mealy texture, relatively free of disintegration, and have a mild taste free of off-flavors. For baking, the same attributes apply, but the potato should have a higher dry matter content. After all, it can't disintegrate. The skin will hold it together.

The author is a potato quality specialist with the Potato Breeding Section, CDA Research Station, Fredericton, N.B.

POTATO QUALITY

Scoring processed potatoes.

When cooked, the samples are placed on white plates under a uniform artificial light and scored. The total score of 100 points is based on texture, color, flavor, and degree of disintegration of the boiled samples. The penalty for discoloration is entered on the score sheet about 15 minutes after the sample is first placed on the plate. A panel of at least three experienced persons score the samples and calculate the averages.

Potato chips and French fries have shot into popularity in recent years. Both industries have grown by leaps and bounds. And the pressures on research facilities at the Research Station in Fredericton reflect the new taste in potatoes. As early as 1957 testing was undertaken specifically for the potato chip industry and testing for quality in French fries was started two years later.

The potato chip industry requires varieties with high specific gravity, which will produce a product that is light golden brown in color under a wide range of conditions, often following prolonged storage, during which time alterations of sugars have taken place. Our investigations involve tests being carried out in late summer on early harvested tubers, periodically throughout the winter from controlled storage chambers at three separate temperatures, and finally in early summer on old potatoes which have been treated with sprout inhibitors.

The French-fry industry also requires varieties with high specific gravity, and the ability to process into golden brown fries of even color and texture after prolonged storage. Because a blanching process is often introduced in the production of French fries, the achievement of proper color is not as critical as in the production of chips. But size and shape of potatoes take on greater importance. Until the plant breeders come up with a square potato, the industry will have to invent by-products to utilize short and misshapen slices from the sloping sides of the tuber. The public is adamant. It wants a French fry of perfect geometric form, long, with squared-off ends, firm, tender, mealy, not greasy, golden brown outside and creamy white inside.

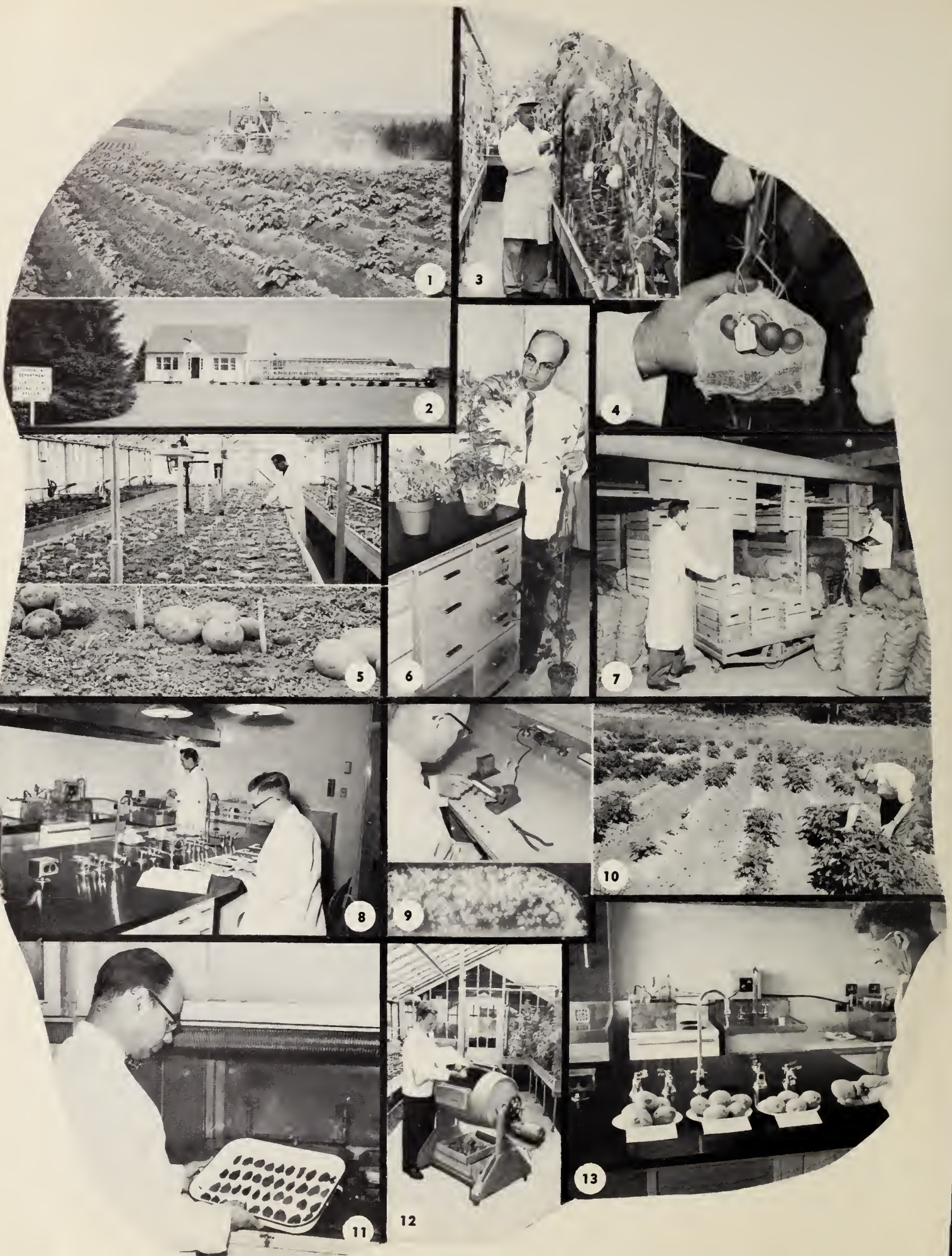
The plant breeders at the Fredericton Research Station, in their attempts to satisfy the taste demands of the public and the economic demands of the growers, have given the industry several new varieties in the past few years.

Keswick, for instance, is a potato with good table quality, combined with the ability to make both French fries and chips early in the season. For the fry trade alone, the growers in the State of Maine planted 500 acres of Keswick in 1965.

Fundy and Hunter are varieties highly rated for their table quality, and Grand Falls, introduced primarily for the starch industry, has proved an excellent table potato and a splendid French frier.

The variety Avon was released for the chipping trade, but it also is an excellent table potato and has the added advantage of early sizing.

The potato industry is getting more and more specific as time goes on. The search for new varieties with special attributes continues. And in the testing laboratory of the CDA Research Station in Fredericton, samples will continue to be selected, cooked, tasted, and scored in the endless quest for the perfect potato.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1. Spraying seedlings at Alma Substation.
2. Potato Breeding Substation, Alma.
3. Potato breeding greenhouse, Frederiction.
4. Potato seed balls from controlled cross.
5. Potato seedlings scab-resistance test. Inset: Close-up of seedlings.
6. L. A. Dionne with potato hybrid (center) and parents, in disease resistance study using wild potato.
7. Seedlings are shipped to stations in the National Potato Breeding Project.
8. Scoring "french fries" from Fredericton seedlings in Potato Processing Laboratory.—H. T. Davies.
9. Testing for potato virus X by serology. Insect: Clumping indicates virus present.
10. J. Munro checks potato seedling resistant to virus Y; infected plants on either side.
11. A detached leaf test for evaluating blight resistance of seedlings.
12. Operating station-developed "spud-nicker" to test seedlings' resistance to skinning and bruising—D.A. Young.
13. Examining three of the five varieties introduced in the National Potato Breeding Program.—L. C. Young.

CDA POTATO BREEDING PROJECT AT FREDERICTON

This, the largest single project at the CDA Research Station, Fredericton, has developed from a modest beginning in 1934 to one of national importance. The objective is to develop new varieties that are superior to existing ones in one or more characteristics of economic importance and equal in others. A major aspect is the incorporation of resistance or immunity to one or more diseases in new introductions. In order to meet this objective basic research on many of these diseases has been necessary. A study of the organism responsible for late blight and of the inheritance of resistance to same has resulted in the establishment of the existence of many races of the causative organism. These, to date, have made it impossible to develop a variety completely immune to the disease although it may be immune to one or more races. The physiology of potato quality and disease resistance are being investigated. Research is also being conducted on potato breeding at the diploid level.

Numerous virus diseases are of economic importance and a study of these is also a major part of the program. Immunity to some of these can only be found in certain species of wild potatoes which are difficult to utilize in a breeding program largely because of cross incompatibility. Research into methods and techniques whereby these may be utilized is showing promising results.

The program is a co-operative one, with some twenty-five or more federal, provincial and university research units in Canada taking part. Seedling material is tested in all provinces and regions and the results are assessed by a Central Working Committee, with regional representation.

To date eight new varieties have been introduced, namely, *Avon* a chipping variety with common scab resistance for Nova Scotia; *Canso*, a main season variety with some resistance to late blight; *Fundy*, an early, smooth tuber variety with some blight resistance; *Hunter*, a high quality table potato; *Grand Falls*, introduced primarily for the potato starch industry; *Sable*, an early variety suitable for harvesting 80 to 90 days after planting; *Huron*, a scab resistant variety for Ontario; and *Keswick*, an early mid-season variety with some late blight resistance. All varieties are of good to excellent cooking quality and satisfactory yielding ability.

One of the greatest present demands is for varieties for special processing purposes, and with specialized regional adaptation.

ALFALFA POLLINATION DATES AFFECT SEED PRODUCTION

A. G. KUSCH

At the CDA Experimental Farm, Fort Vermilion, Alta., we have investigated the production of mature alfalfa seed as influenced by dates of pollination. We had noted that, in certain years, the seed set was heavy but not much mature seed was produced. We knew that native pollinators, mostly bumble and leaf-cutter bees, were necessary to effectively cross-pollinate alfalfa. Our observations showed that, in many years, the numbers of these bees in alfalfa fields were small in the early part of the summer. However, there were often large numbers of them in the latter part of July. This seemed to indicate that date of pollination was important in the production of mature seed. Hence, we initiated a study at Fort Vermilion to determine the periods of pollination which would produce mature seed before the first killing fall frosts occurred.

Our long-term weather records at Fort Vermilion (which is about 100 miles south of the Northwest Territories border) show an average of 1,095 hours of sunlight for the growing season, (May 1 to August 31), and a frost-free period of 104 days which normally terminates on September 7. This frost-free growing season of long days should be quite sufficient for the production of mature seed of alfalfa—but, as mentioned earlier, although seed set in some years had been heavy, little mature seed was produced.

Our study was conducted on a field of Grimm alfalfa. When blossoming commenced in early July, 50 flowers were manually cross-pollinated and tagged each week. This procedure was carried on until the second week in August.

Following pollination, we made careful observations to establish the date of maturity of the seed for each date of pollination. Seed was considered mature when it became hard and had good germination.

We continued the study for three successive years. During the first year, cloudy and wet weather was experienced from the last week of July until the first week of September with six inches of rain being recorded. In our opinion, this weather undoubtedly influenced seed setting and maturity. It was also a factor in restricting the activity of pollinating insects. The second year was very dry and hot in July, favoring seed setting and maturity. The third year was wet, cool and cloudy from May to August with very little sunshine. This had the effect of stimulating excessive vegetative growth while delaying blossoming and the buildup of native pollinators. In this third year, it was not until the second week of July that the first blossoms appeared and not until August that the bee population built up to any appreciable extent.

The results of each year in the three-year study followed a similar pattern for seed maturity, regardless of the weather.

Our data show that in each of the three years, the longer the pollination was delayed after mid-July the greater the number of days required to mature seed. Furthermore, flowers pollinated toward the end of July or the beginning of August did not produce mature seed before killing frost. This was true even when the first killing frost did not occur until October 5. The type of weather during the flowering and seed maturation period did not appear to affect the final result.

The results indicate that alfalfa seed production in far northern areas depends on a build-up of native pollinators during the first three weeks of July so that cross-pollination can be effective and high yields of mature seed obtained.

The practical application of this study for northern area farmers having fields of alfalfa for seed production is that they would be well advised to examine their fields for seed setting about the third week in July. If no appreciable seed set is observed at this date, they could still cut the alfalfa for hay of a reasonable quality. However, if a field with very little seed set in the fourth week of July is left for seed, as so often happens, it would be almost a total loss. It would produce no appreciable amount of seed and the value which could have been obtained from hay would also be lost.

The author, now with the CDA Research Station, Beaverlodge, Alta., was formerly Superintendent of the CDA Experimental Farm, Fort Vermilion, Alta.

PUBLICATIONS

Copies of these, and a list of other publications may be obtained free of charge (unless otherwise stated) from: Information Division, Canada Department of Agriculture, Ottawa.

On peut obtenir gratuitement (à moins d'avis contraire) des exemplaires de ces publications ainsi qu'une liste d'autres publications à: la Division de l'information, ministère de l'Agriculture du Canada, Ottawa.

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LIST OF PUBLICATIONS. All publications currently available from Information Division, Canada Department of Agricuture.

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